VOL. XXV. Nº5. MAY 1940

MECCANO MAGAZINE



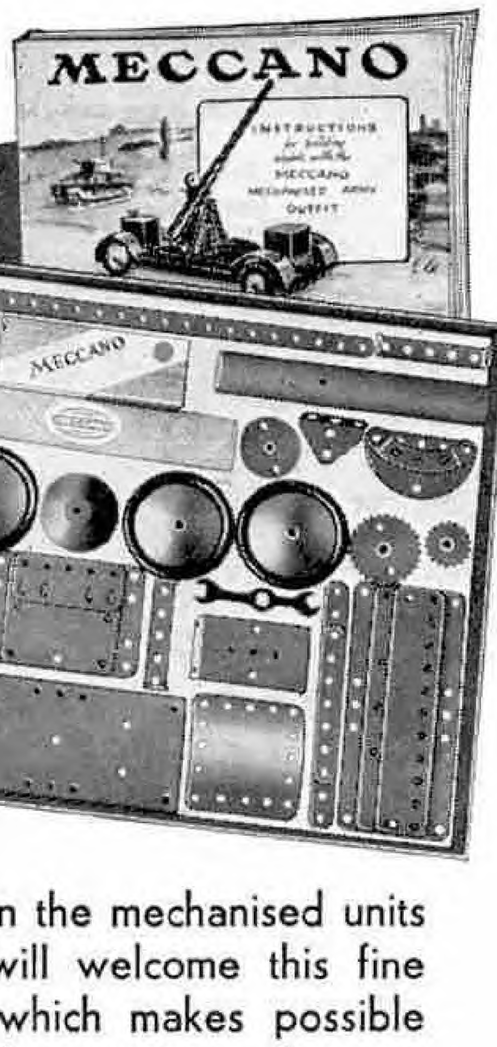
FLIGHT!

MECCANO

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No.			
M1	12½" Perforated Strips	½ doz.	1/6
M2	5½" " "	"	9d.
M3	3½" " "	"	6d.
M5	2½" " "	"	5d.
M6a	1½" " "	"	4d.
M10	Flat Brackets	doz.	1d.
M12	Angle Brackets, ½" × ½"	"	3d.
M14	6½" Axle Rods	"	10d.
M15a	4½" " "	"	7d.
M16a	2½" " "	"	4½d.
M24	Bush Wheels	each	3d.
M34	Spanners	"	1d.
M35	Spring Clips	box (20)	2d.
M36	Screwdrivers	each	3d.
M37	Nuts and Bolts, 7/32"	box (12)	2d.
M38	Washers	pkt. (20)	1d.
M48a	Double Angle Strips, 2½" × ½" ...	½ doz.	8d.
M51	Perforated Flanged Plate, 2½" × 1½"	each	3d.
M52	" " " 5½" × 2½"	"	5d.
M90a	2½" Curved Strips, Cranked, 1⅜" radius, 4 to circle	"	1d.
M94	Sprocket Chain, 40" length ...	"	6d.
M95a	" Wheels, 28 teeth, 1½" dia.	"	4½d.
M96	" " 18 " 1" "	"	3½d.
M103	Flat Girders, 5½"	½ doz.	1/3
M103f	" " 2½"	"	8d.
M111	Bolts, ¾" long	doz.	3d.
M111c	" ⅜" "	"	1½d.
M111d	" 1⅛" "	"	6d.
M125	Reversed Angle Brackets, ½" ...	½ doz.	3½d.
M126	Trunnions	each	1½d.
M187	Road Wheels	"	5d.
M188	Flexible Plates, 2½" × 1½"	doz.	9d.
M189	" " 5½" × 1½"	"	1/3
M190	" " 2½" × 2½"	"	1/–
M190a	" " 3½" × 2½"	"	1/6
M192	" " 5½" × 2½"	"	2/–
M200	Curved Plates, 1 11/16" radius ...	each	1½d.
M212	Rod—Strip Connectors	"	1d.
M214	Semi-Circular Plates, 2½"	"	2d.
M217a	Discs, 1¼"	doz.	9d.
M219	Wheel Discs	each	1½d.
M220a	Gun Barrel, Large	"	3d.
M220b	" " Medium	"	2d.
M220c	" " Small	"	1d.
	Manual of Instructions	"	3d.



Every boy is interested in the mechanised units of the British Army, and will welcome this fine Mechanised Army Outfit, which makes possible the building of models of a variety of Army prototypes.

The Outfit consists of a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.

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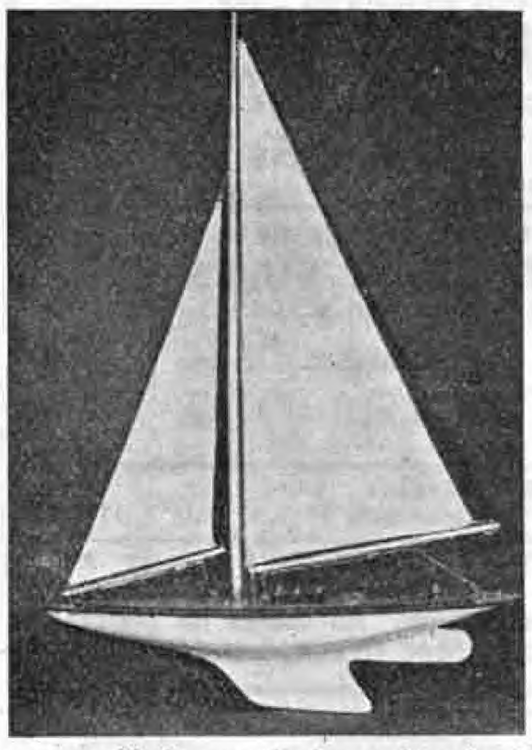
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Here's something new from the FROG factory — a series of kits for building realistic flying models of R.A.F., French and German Air Force machines. Like all other FROG models they are designed and manufactured by International Model Aircraft Ltd., a guarantee of their superb quality. All the parts are clearly printed on best quality balsa, tycoon tissue for covering and a supply of quick-drying cement are included. Blanks are supplied for both scale and flying airscrews, while engine cowls, airscrew spinners, moulded wheels, elastic motors, correct insignia and full-scale working drawings make the kits absolutely complete. Ask to see them at your local toyshop or store.

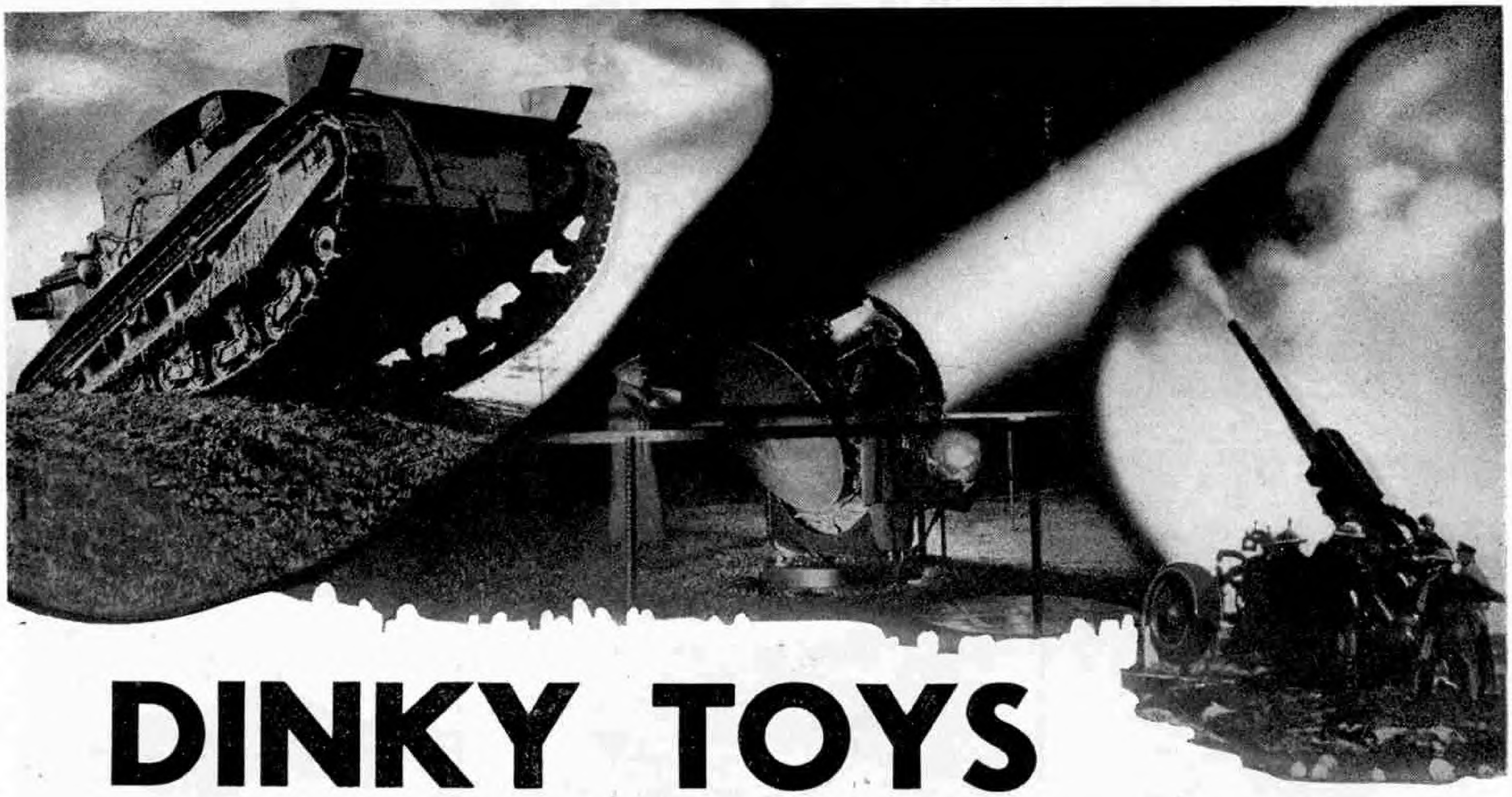
The range at present includes the Westland "Lysander," the Curtis 75a and the Messerschmitt Me 109, while the Boulton-Paul "Defiant," the Morane-Saulnier MS 406 and the Heinkel He 112 U are now in preparation. To make these machines more realistic and airworthy they can be finished with FROG tautening dope and the correct shades of FROG paint which are sold by all FROG dealers.

PRICE OF COMPLETE KIT 5/-

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ROYAL TANK CORPS MEDIUM TANK SET



151a



151d



150d



151c



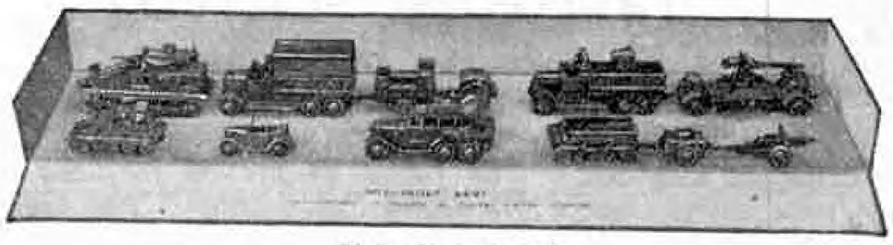
151b

Dinky Toys No. 151

No. 151a	Medium Tank	each	**1'9**
No. 151b	Transport Wagon ...	"	**1'2**
No. 151c	Cooker Trailer	"	**7d.**
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Dinky Toys No. 156

This fine set contains the principal units of a modern mechanised army. It includes the following items:
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Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).

Price **12'6**

18-POUNDER QUICK-FIRING FIELD GUN UNIT



Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor. Price **2'6** per set

ROYAL TANK CORPS PERSONNEL



150a 150b 150c 150e

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No. 150a	Officer	each	**2½d.**
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152a 150d 152b 152c

Dinky Toys No. 152

No. 152a	Light Tank ...	each **1'2**	No. 152c	Austin Seven Car	each **5d.**
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Dinky Toys No. 160

For use with Dinky Toys No 161, Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.

No. 160a	N.C.O.	each	**2½d.**
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160a 160b 160c 160d

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Dinky Toys No. 60r
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Dinky Toys No. 62p
Scale model of the largest British air liner. Six models available, named *"Ensign," "Elsinore," "Explorer," "Echo," "Ettrick"* and *"Elysian."* Price **1/6** each

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MAYO COMPOSITE AIRCRAFT



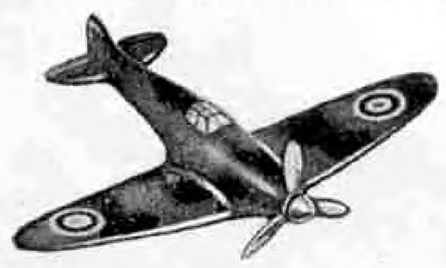
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Scale model of the Mayo Composite Aircraft.
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The components of the above can be purchased separately.
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No. 63b Seaplane *"Mercury"* ... „ **1/-**

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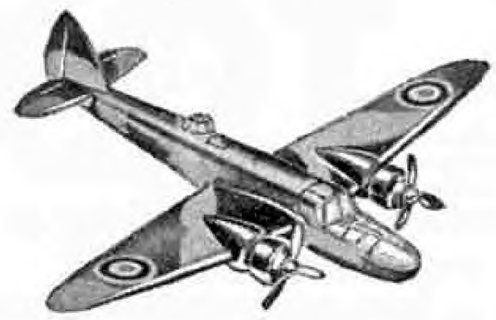
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Dinky Toys No. 62e (Camouflaged)
Scale model of the Vickers-Supermarine "Spitfire," one of the fastest fighter aircraft used by the Royal Air Force. In many successful encounters with German aircraft the "Spitfire" has proved its superiority. It is heavily armed, and has eight forward-firing fixed machine guns in the wings.
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Dinky Toys No. 67a
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Dinky Toys No. 61
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Dinky Toys No. 62h
Scale model of the Hawker "Hurricane" single-seater Fighter extensively used by the R.A.F. Price **6d.** each

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Dinky Toys No. 62w
Scale model of the Imperial Airways "Frobisher" class liner. Three models available named: *"Frobisher," "Falcon"* and *"Fortuna."*
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Dinky Toys No. 60t
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Dinky Toys No. 60v
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
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FLYING BOAT "CLIPPER III"

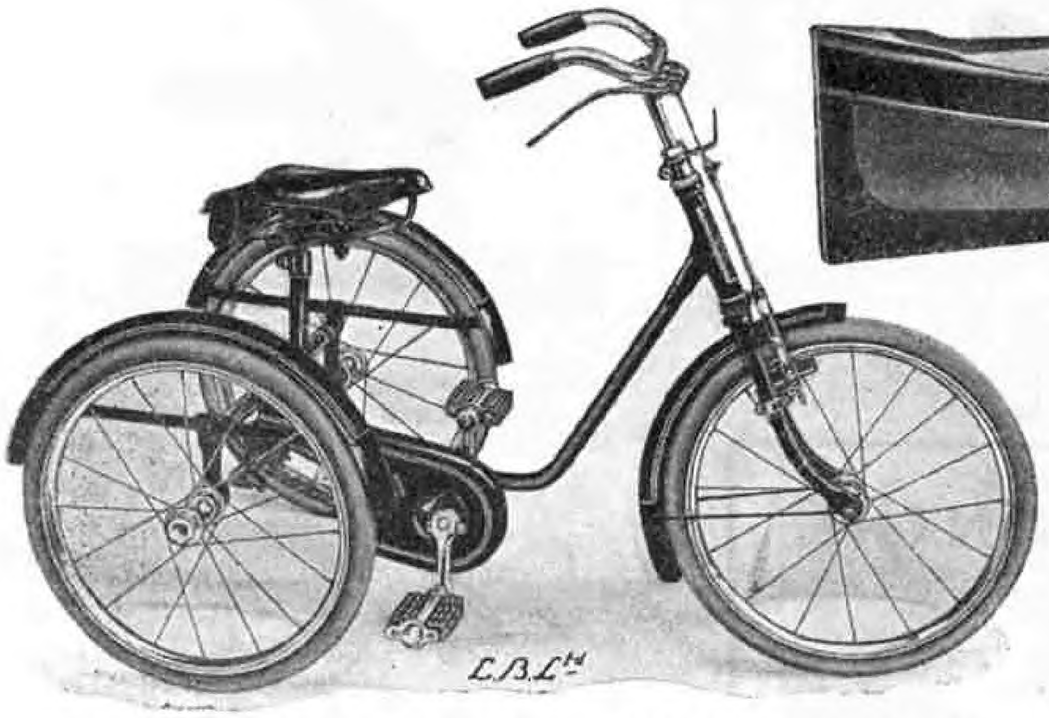


Dinky Toys No. 60w
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ALL BRITISH TOYS



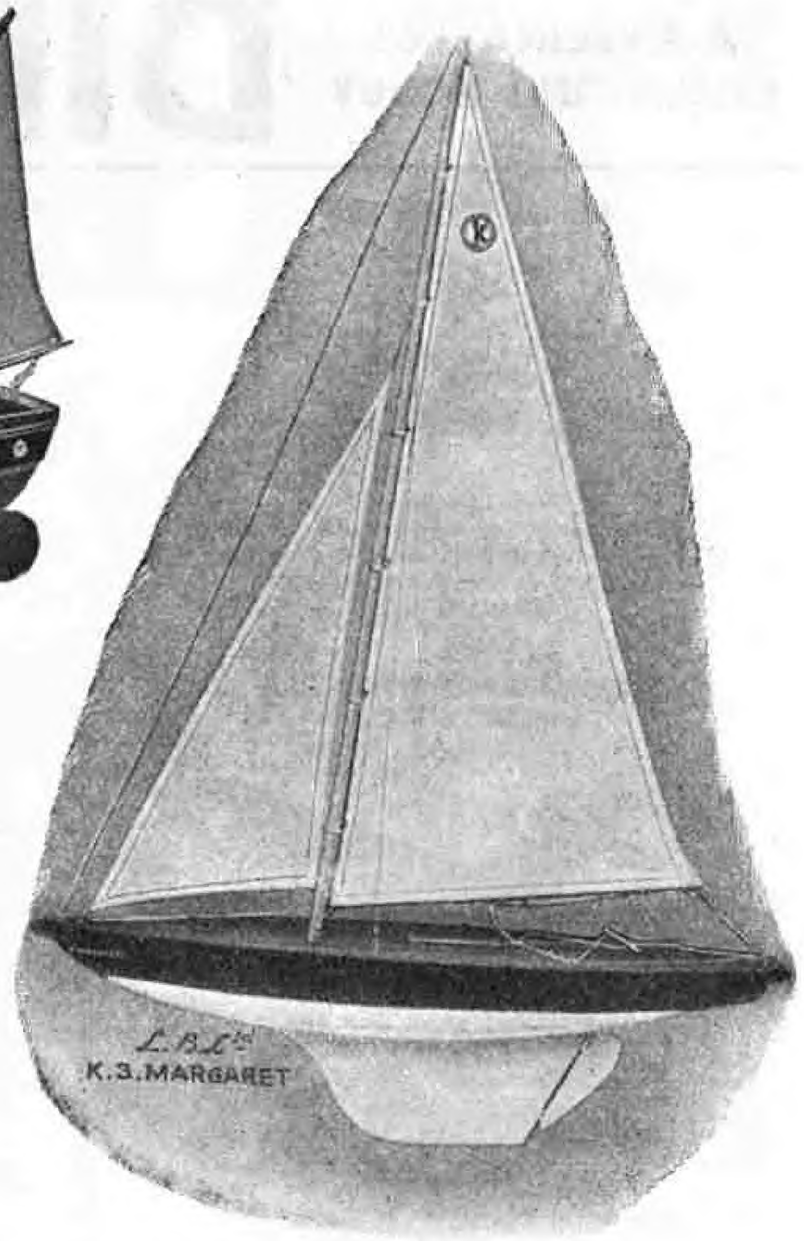
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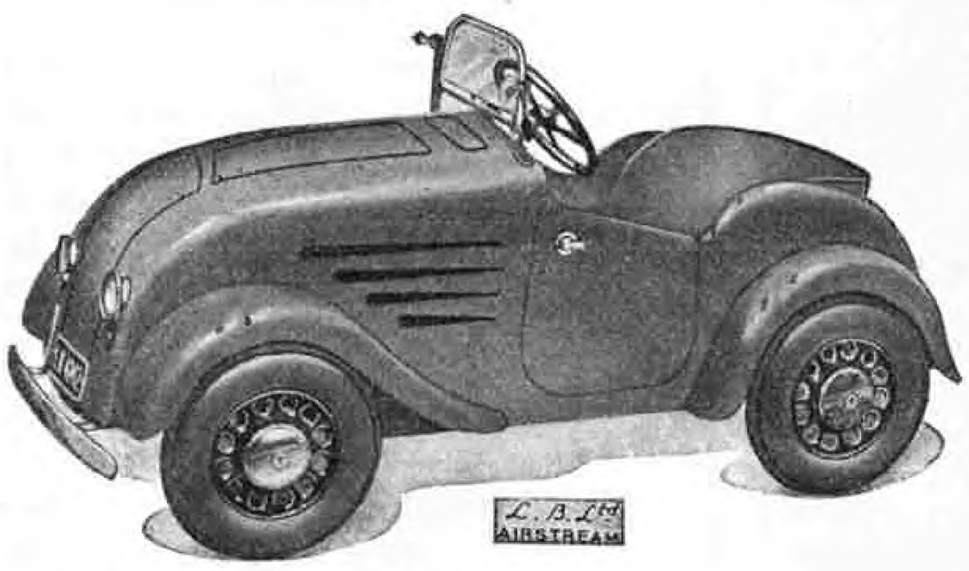
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SPEED BOATS, ETC.

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Magnificent craft with AUTOMATIC STEERING. Patent light-weight weather resisting hull. Solid mahogany polished deck. Mast and boom made from finest selected material, best quality sails, fully adjustable. Beautifully finished in blue and white. Length of hull, 26 in.

TRI-ANG TOYS are obtainable at all good toy shops and stores

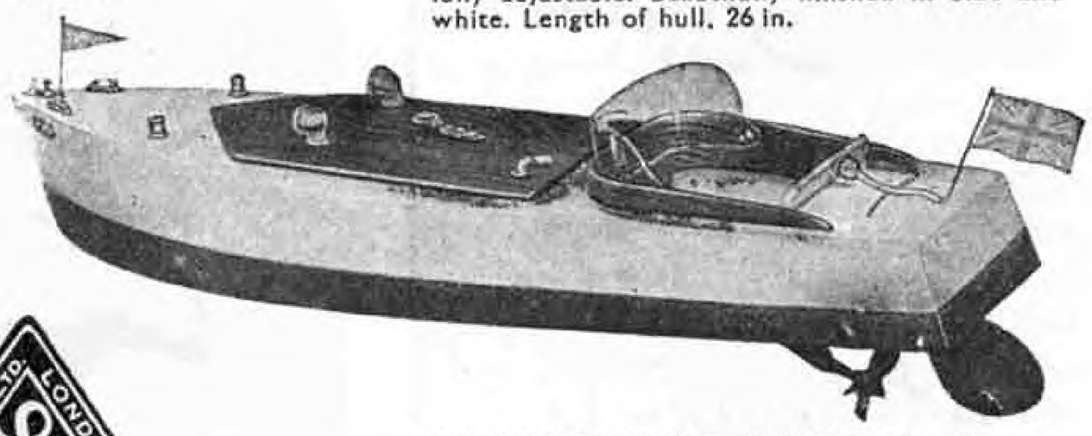


TRI-ANG AIRSTREAM

New Model. Steel body with opening side door, upholstered seat. Adjustable wind screen and direction indicators. 9 in. new type easy-clean wheels with malleable hubs, ⅝ in. tyres. Hand brake. Length 44 ins. Suitable for ages 4 to 7.

L. BROS. LTD. LONDON BROS. ENGLAND

TRI-ANG TOYS



TRI-ANG SPEED BOAT No. 3

Specially designed hull with mahogany deck, brass fittings, ventilators and detachable motor cover. Electric motor mechanism. Complete with bow pennant and stem flag. Hull 20½ in. overall.

MINIC

ALL TO SCALE CLOCKWORK TOYS

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MINIC Ford Saloon. Also obtainable in camouflage colours.



MINIC Vauxhall Cabriolet. Also obtainable in camouflage colours.



MINIC Six Wheel Army Lorry. Also obtainable in camouflage colours.



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MINIC Breakdown Lorry. Also obtainable in camouflage colours.

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Next Month: "THE SPIDER ON WAR WORK." Publishing Date: 1st June

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With the Editor

Plans for Future Issues

Eight months of war against the Nazi gangsters and the people under their brutal rule have brought about many unpleasant but necessary changes in our civil life. The restrictions wisely imposed by the Government affect us all in a variety of ways, and some of them have made the task of producing the "*M.M.*" much more difficult. Many of the most interesting topics are now banned entirely because of the danger of giving information that might be useful to the enemy; and in other directions the material available is strictly limited. Very little can be said about home shipping; much of the home railway news available is dull, and civil aviation has faded into the background. In spite of this lack of material I am determined that there shall be no falling off in the variety and interest of the Magazine, and I have made plans which, I am confident, will please all readers.

Navy, Army and Air Force

The articles by Captain H. S. Broad and Flight-Lieutenant "Tommy" Rose, dealing with the wonderful exploits of R.A.F. fighters, bombers and reconnaissance aircraft, have proved so popular that I have arranged for others on similar lines, and a splendid one will appear next month. In addition there will be coming along exciting descriptions of the work of the Royal Navy and of the Army, written by men who have actually been through stirring experiences of the kind they deal with. The article "A Motor Racing Mechanic Speaks," in last month's issue, has aroused great interest, and this month I follow it with an account of one of "B. Bira's" most exciting races. Other thrilling motor racing stories are in hand.



Lieutenant-General Sir Walter King Venning, K.C.B., C.M.G., C.B.E., M.C.

How Things are Made

Articles describing how things are made or produced have always been popular with the great majority of "*M.M.*" readers, and this month I draw special attention to "Flour Milling" (page 228) and the first instalment of "The Story of Tin" (page 214). I have in preparation many other splendid articles of this kind.

So, after all, things are not so bad, and my readers and I can keep on smiling. At any rate, folks seem to have been worse off in King John's time, according to an answer to an examination question given by a small boy of my acquaintance: "King John had a row with the Pope. The Pope put the country in an interdict. Everything was dull."

Leaders in the War

VII. Sir Walter Venning

Lieutenant-General Sir Walter K. Venning was born on 17th January 1882, and was educated at Clifton College, and the Royal Military College, Sandhurst. He was commissioned in the Duke of Cornwall's Light Infantry in 1901, served throughout the war of 1914–18, and was awarded the C.M.G. From 1919 to 1921 he was an instructor at the Staff College. After important service in India, and promotion to Major-General, he became Director of Movements and Quartering, War Office. He was promoted to Lieutenant-General in 1938, and last year was appointed Quartermaster-General to the Forces.

Sir Walter has described himself as "the housekeeper of the Army," a good definition of his very responsible position. He has the huge task of providing for every need of the Army—food, clothing, accommodation, arms and mechanical equipment, and transport by land or sea.

Story of Tin

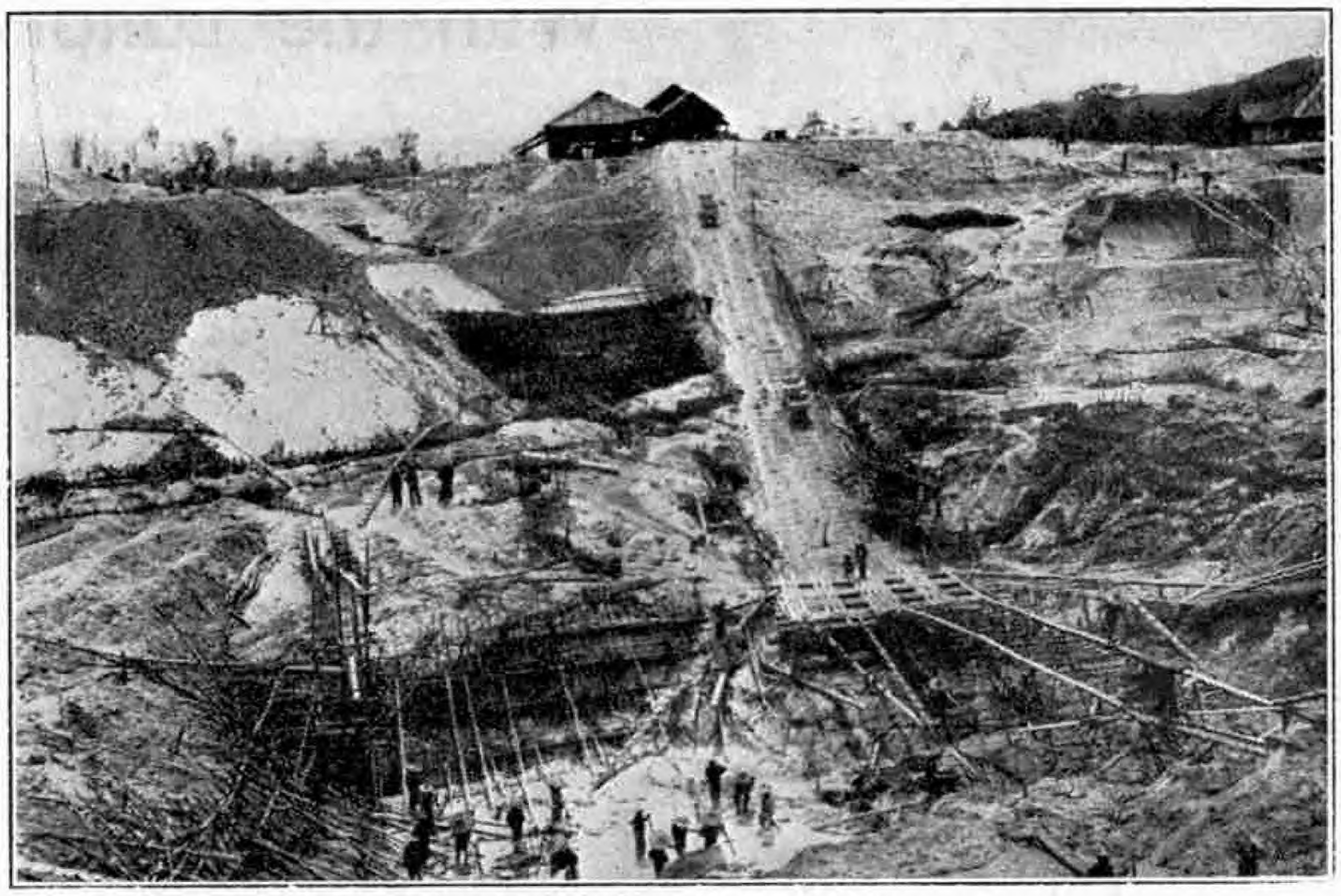
I.—How the Metal is Mined and Smelted

THE word "tinny" is often used to describe something that is cheap and rubbishy. This is an undeserved insult to a metal that is of the greatest value, and for which a surprisingly large range of uses has been found. It has indeed been said that if the alchemists' dream of transmuting metals were to become a reality, we should not change other metals into gold, but rather into tin, which is much more valuable in industry and in everyday life.

Most of the world's tin is used for coating steel plate, from which cans for preserving food are made. This practice is followed on such a huge scale indeed that in Great Britain the word "tin," which strictly means the metal itself, is actually applied to the containers. Other uses to which tin is put are legion. It forms part of solders, type metal, pewter and enamelware. Its use in hardening copper is well known, and it is an essential part of the alloys brass and bronze. A modern development that has provided a further use for large quantities of tin is the introduction of collapsible tubes. Those that are used for packing acid materials are given an inner coating of tin, and the metal enters also into other alloys from which tubes for special purposes are made.

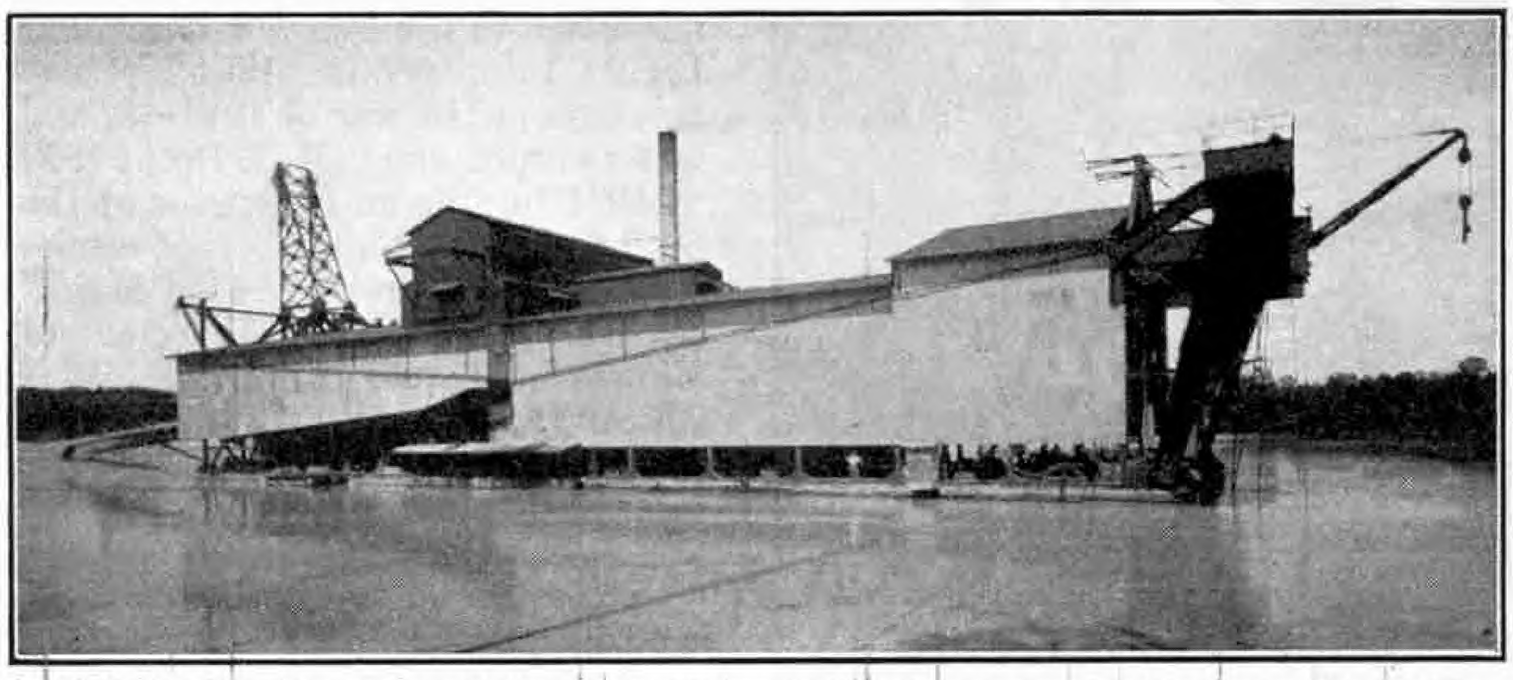
Apart from its many uses tin has a romantic story, for it has been a friend of man since very early times. When the world emerged from the Stone Age into that of metals, the way was led by bronze, the familiar alloy of copper and tin, and the search for the metal led to some of the earliest voyages into unknown waters. The aim of these early explorers, who were Phœnicians from the Eastern Mediterranean, was to reach the Cassiterides, or Tin Islands, which lay beyond the Pillars of Hercules that guarded the exit from the Mediterranean Sea into the Atlantic Ocean.

It now seems certain that the Cassiterides were the islands off the coast of Cornwall, and Britain was thus a source of tin in very early times. One of the first references to its association with the metal occurs in the writings of Diodorus Siculus, a Greek of the first century B.C. From him we learn that the inhabitants of the extremity of Britain were skilful workers of the earth that yielded tin, which occurred in veins in the rocky ground. After the tin had been melted down and purified, it was cast into blocks that were carried to an island called Iktis, which was cut off from the mainland only when the tide was at flood. This island probably was St. Michael's Mount, which thus appears to have been used as a market place where merchants bought tin from the natives for transport across the sea and through Gaul to Rome.



An open-cast Chinese tin mine in Malaya.

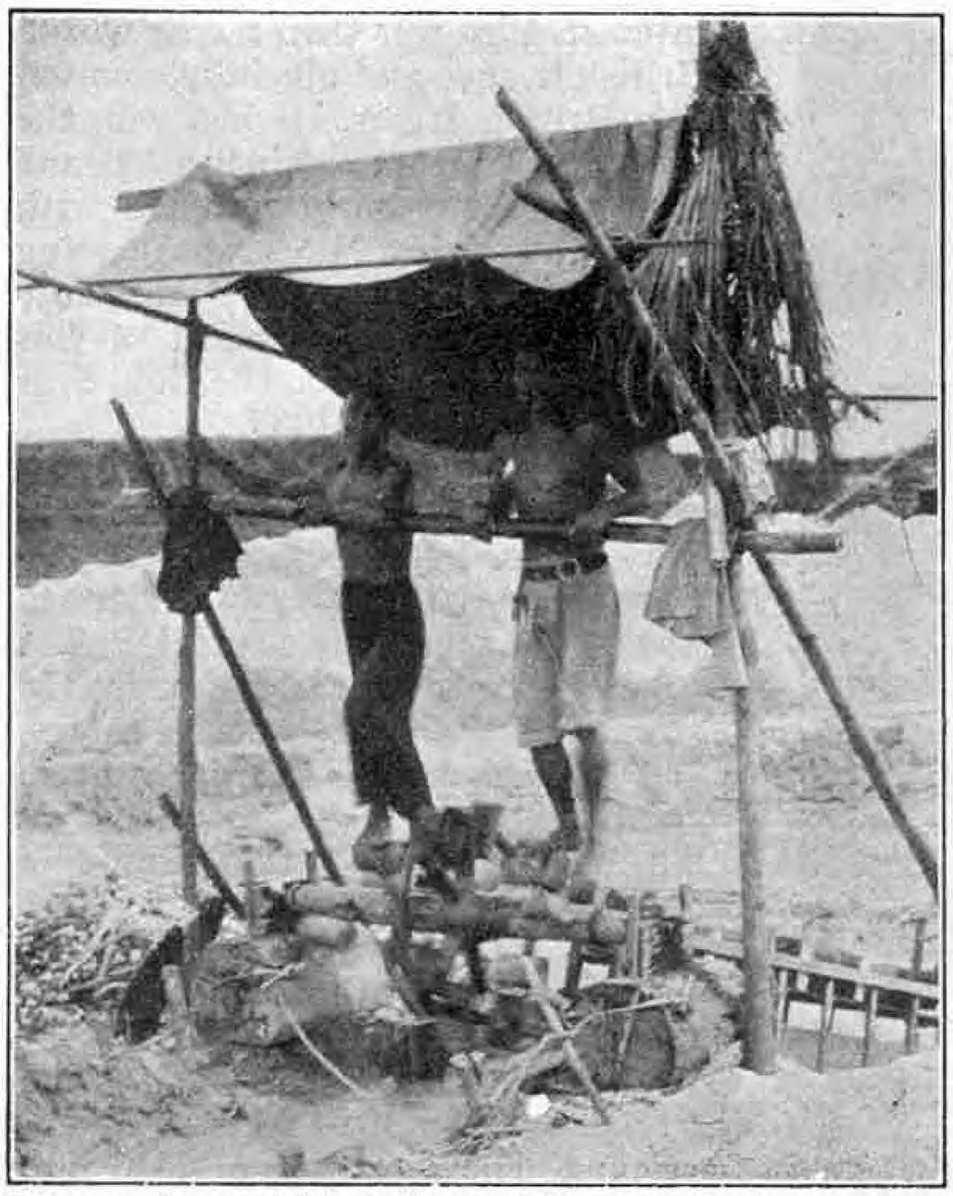
Cornish tin is found in veins in hard granite, which is difficult to mine. Some of the mines are open, but as the veins near the surface have become exhausted it has been necessary to delve more and more deeply into the Earth. The Dolcoath mine indeed has been driven down to a depth of 3,600 ft. Galleries branching off from the mine shaft at various levels have been driven through the obstinate rock, first by means of hand tools, and in more recent times by blasting; and in this work, carried on in a hot and stifling atmosphere, Cornish miners have acquired skill that has made them famous in mining countries all over the world.



The tin dredge of largest capacity in Malaya. The illustrations to this article are reproduced by courtesy of the Malayan Information Agency.

In the plan usually followed in Cornish mines, galleries are driven above and below the block of ore to be removed and a short vertical shaft is cut to connect the two. Mining is then begun at the angle made by the upper gallery and the vertical shaft, and ore crashes down through the shafts to the lower gallery, from which it is carried away in tubs to the shafts. As work proceeds, other vertical shafts are opened up, and eventually a huge cavity is left where the ore once was, and this has to be boarded up with stout timbers in order to prevent caving-in.

Up to the 19th century Cornwall remained the greatest tin-producing district in the world, and it is estimated that by then the county had yielded more than two million tons of the metal. Then came a great drop in production, which has reduced Cornwall's proportion of the world's output from half or more to only four or five per cent. This was partly due to the expense of raising the ore from greater depths, but another reason for it was that other countries began to yield tin more cheaply. Of these countries the most important is Malaya. It has long been known that tin existed there. The Egyptians of Ptolemy's time may have obtained the metal from Malaya, at a time when the earliest Cornish tin mines were being worked, and the Chinese certainly have worked the Malayan deposits for several centuries.



Natives on the treadmill, working a chain pump removing water from a Malayan tin mine.

There are many ways in which tin is extracted to-day in Malaya. One of the most primitive and picturesque of these is panning, or "dulang." There are enormous tracts of tin-bearing ground scattered about the country, and these are exploited by Chinese women, who work on their own account in streams and rivers. A quantity of sand and water is dug up from the bed of the stream in a shallow wooden dish, which is then given a peculiar motion that washes waste material over the edge, leaving the heavy ore behind. This is hard work in the heat of the day, for the women engaged in it are continually standing with bent backs in water.

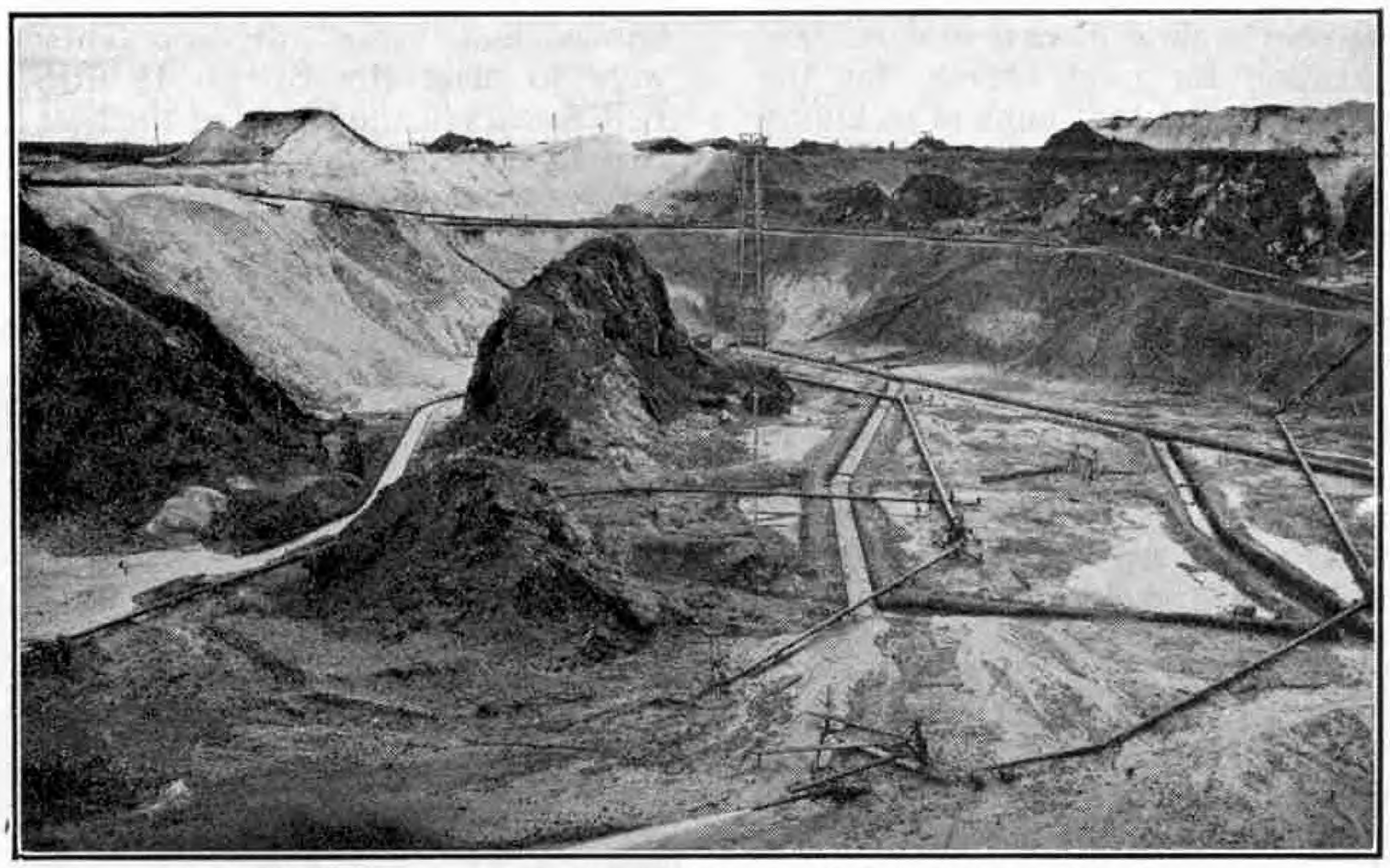
Open-cast mining also is carried on in Malaya, and some enormous excavations have been made by this method. Thus the old mine of the Sungei Besi Mines Ltd. is 3,000 ft. long, 1,200 ft. wide and 120 ft. deep, and about 16 million cu. yds. have been cut out to form it. The Hong Fatt mine is even larger, for it is 300 ft. deep, and over 65 million cu. yds. of earth have been taken out of it. In these mines the ground is broken up by a kind of hoe. The old Chinese method of working was to remove the material in flat baskets hung at the ends of a pole and carried out of the great pit on the shoulders of coolies, who climbed up crude ladders of notched logs. The Sungei Besi Mine and others are now equipped with electric power, however, and the tin-bearing earth is carried to the surface in trucks running on light rails.

Water has always been a difficulty in these mines, but the Chinese are clever in dealing with this enemy. One of their chief devices is an ingenious chain pump, made of wood, in which boards set at right angles to an endless wooden chain are pulled upward in a sloping wooden trough that has its base in the sump. The chain is revolved either by a treadmill, as shown in the illustration on this page, or by means of a waterwheel. Steam and oil engines have been used for pumping in more recent times, but of late years electricity has been replacing other forms of power, and four Ruston-Bucyrus electric excavators are used in the Hong Fatt mine.

One spectacular way of mining that is largely employed in Malaya is known as hydraulicing. In this a jet of water under high pressure is directed on the face of the mine, which is simply washed away. The resulting mixture flows down a ditch or a wooden sluice, in which the ore is partially concentrated by the flow of water. "Dulang" women are employed to continue the concentration.

To provide water for work of this kind a dam may be constructed in the bed of a stream to raise the surface to a level well above that of the mine. In some cases elevators are employed to lift the water to sufficient height to give the required pressure. The quantities of water required vary considerably, as do also the pressures used. In some mines 100 cu. ft. of water a minute at a pressure of 50 lb. per sq. in. is sufficient, but there is one mine that has a pipeline carrying 6,000 cu. ft. of water a minute, and having a pressure at the nozzle of 170 lb. per sq. in.

Hydraulicing produces large quantities of waste material, known as tailings, and their disposal often presents great difficulties and involves much expense. These difficulties are particularly great in hilly ground, and in the past great damage has resulted. In one case an entire town has been buried in sand brought down by floods. Because of these difficulties hydraulicing in hills has now been stopped, except in special localities.



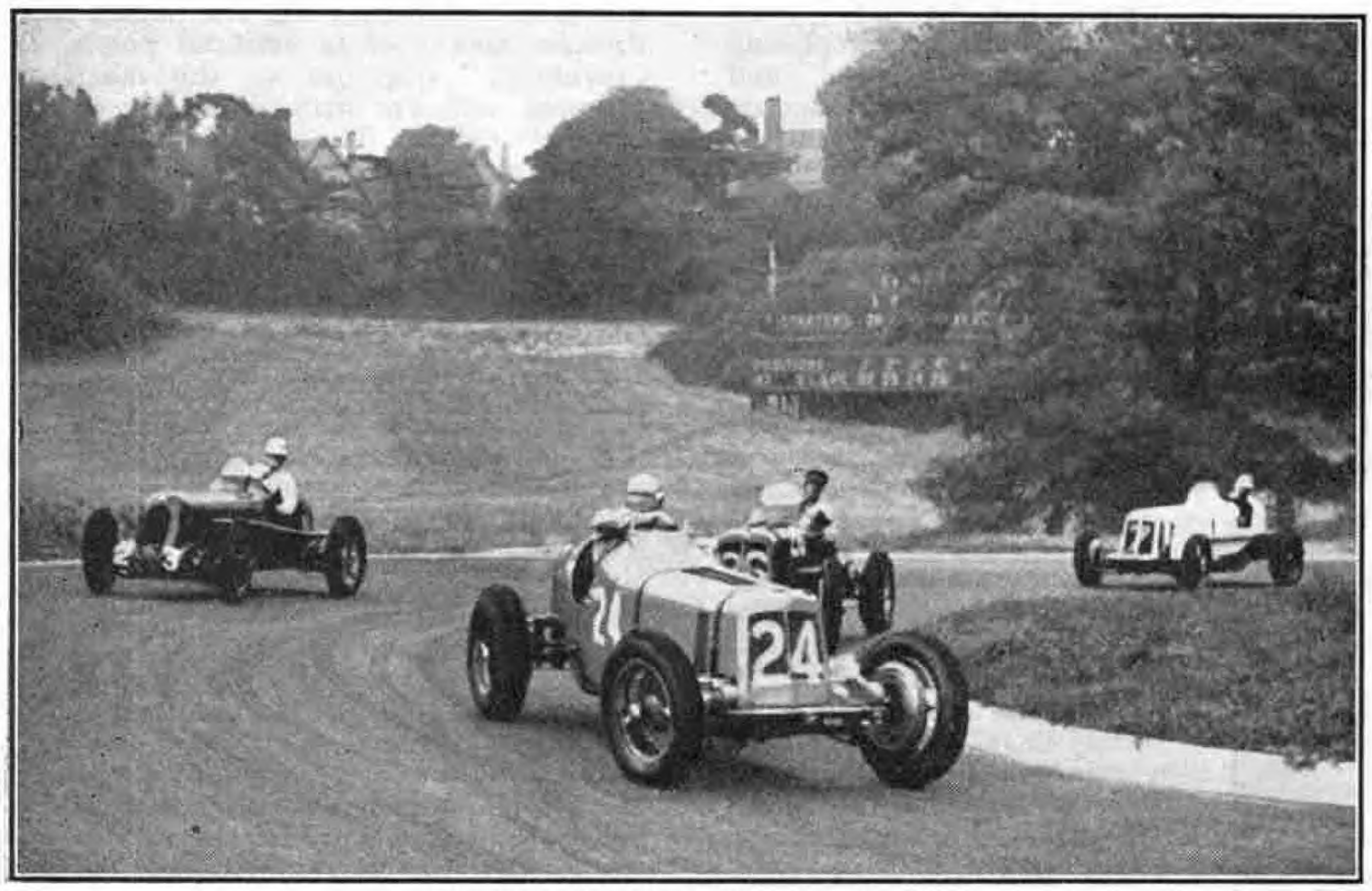
Hydraulicing in progress in the Kinta Tin Mines, Perak, in the Federated Malay States.

An increasing proportion of Malayan tin is produced by dredging, which is so cheap that ground of low value can be worked profitably. In 1921 there were only 30 dredges in Malaya, but this number increased to 119 by 1931. The bucket type dredges used float in artificial ponds, or "paddocks," dug out as the machines progress, and are manœuvred by means of wire cables. The ground from the bottom of the paddock is scooped up by manganese steel buckets carried on an endless chain running over rollers mounted on the ends of a steel ladder. It is delivered at the top of their circuit into a hopper or chute, and there jets of water break it up and carry it through screens into a distributor, from which it is fed with water into sluices in which the tin ore is concentrated.

Some of the dredges now employed are of a giant size. There is one that digs to a maximum depth of 130 ft. below water level. Its dredging ladder is 195 ft. in length, and with its 12 cu. ft. buckets has a total weight of 834 tons.

Another method largely used by the Chinese is to break up the ground by powerful jets of water and pump the resulting mixture of sand, clay and water to the head of a long flume, in which there are wooden bars at intervals. Most of the lighter sand and clay is carried down the flume, but the heavier tin-bearing ore is kept back behind the bars.

The end of all these operations is a concentrated tin ore containing about 75.5 per cent. of the metal. Practically the whole of this is smelted in the Straits Settlements by two large European concerns. Both use modern oil-firing furnaces, in which a mixture of the ore with limestone and anthracite is roasted. The anthracite reduces the tin ore to the metal, and the limestone acts as a flux to remove gangue. At intervals molten tin is tapped off from the furnace and is refined by melting and agitating it, skimming off the dross formed on the surface. Formerly Chinese smelted Malayan tin, but to-day there is only one Chinese smelter, in Kuala Lumpur. There blast furnaces are employed. These are started by lighting a fire of alternate layers of charcoal and mangrove wood, after which the ore is fed in from the top. The molten tin produced is run out through a taphole into a trough, from which it is ladled into cast iron moulds. The metal is refined by melting and stirring with long-handled iron ladles.



Bira (24) leading Martin (26) and Dobson (7).

The Closest Motor Race Ever

By Prince Chula of Thailand

MOTOR racing is a spring and summer sport, so that winter is the time of year when motor racing people give their cars their big overhaul and also tell each other of past experience both of joys and defeats. Alas, last winter there was no overhauling of cars and no preparation for next season, for the simple reason that none of us knows when next season will be. Thus this year we have to rely on experience more than ever before.

My cousin Bira raced for five years, from 1935 to 1939, while I acted as his manager. He took part in altogether 68 major races, of which he won 20, and was second or third in 22 others. This is, I believe, a unique record. Out of this big list of races, however, if we were to be asked which was the closest race of all, we should answer without hesitation—the Imperial Trophy Race at the Crystal Palace in 1937.

The autumn of that year had seen sweeping Continental successes in motor races in this country. The Tourist Trophy Race for sports cars run early in September was won by France, their Darracq cars occupying first and second places. Then the Donington Grand Prix Race, run on 2nd October, was a sweeping success for Germany. as German cars finished in the first five places.

Now on 9th October British racing cars were to meet the challenge of Italy in the form of 1½ litre Maserati cars. Three of these red low-built little marvels had been brought over and were to be driven by Count Trossi, Count Lurani, and Luigi Villoresi, all of them well-known and "star" drivers. They were to meet the British 1½ litre E.R.A. cars in the hands of the best British drivers, among whom were Raymond Mays, Arthur Dobson, Charles Martin, supported by "B. Bira," the Thai driver.

This race had also an additional interest. Bira was then racing with a British licence and officially counted as a British driver. He had won the Gold Star Championship in 1936, and now was in a close struggle with Raymond Mays. Mays was leading with 67 points, but Bira was close behind with 63. The result of this race would decide also the Gold Star Championship for 1937.

The day was fine, and the importance of the event must also have been fully realised for a crowd of 30,000 people came to the Crystal Palace to watch the race. The Crystal Palace Road Circuit was laid out in the grounds around the actual palace, and was a difficult course full of twists and turns going up and down hill and resembled the circuit of Monaco minus the pavement and the houses standing all round. The circuit measured approximately two miles.

The race was run in two heats and a final with a simple form of handicapping. The cars were divided into three groups, the first for the smallest cars up to 1100 c.c. engine size, the middle group up to 2500 c.c., and a last group for all cars over 2500 c.c. Handicapping was by means of starting times only, and all cars had to cover 10 laps in the heats and 15 laps in the final.

Many people thought that much of the interest of the race was lost by the announcement made that Raymond Mays had had to withdraw his car owing to mechanical defect that occurred during practice and could not be repaired in time. Thus the big struggle between him and Bira for the Gold Star would not take place. The crowd would soon



Bira after he had received his Cup. Prince Chula, wearing cap, is on the rignt.

realise, however, that despite that there would still be plenty of thrills in the race.

There were nine cars in the first heat. The only fast car in the little group was the factory Austin driven by Bert Hadley, but it retired in the very first lap. The real race was carried out by the cars of the middle group. It was Percy Maclure (Riley) who led Lurani (Maserati) in the early stages, because Arthur Dobson (E.R.A.) had started rather slowly. Dobson quickly warmed up, and his better knowledge of the difficult circuit soon told against Lurani. Thus the race became a duel between Maclure and Dobson. However Dobson might fling his white E.R.A. round all the corners, he could not catch Maclure, who as usual was driving without a helmet or goggles. Finally Maclure won the heat, with Dobson second and Lurani third.

Goodacre (Austin), in the small group, led nearly right through the second heat; but the real excitement was between the 1½ litre cars. Martin, driving a dark red E.R.A., led this group from the beginning, but he was hard pressed by Count Trossi on a bright red, sleek and low Maserati, while Bira on the blue E.R.A. was behind them. They raced so closely together that only 3 sec. separated the three cars, and they looked as if they were all being towed by the same car.

Trossi showed himself a real *maestro* in Lap 5 when he passed Martin at a most difficult corner. The three fliers overtook Goodacre (Austin) in Lap 9, and they finished in the first three in that order.

Thus prospects for the final were most open, and the 30,000 spectators were keyed up to the last degree of excitement. A Riley and an Italian Maserati had won the heats, but E.R.As. were close seconds in both cases. What would happen in the final?

Altogether 16 cars came to the start. Goodacre (Austin) led the small group from the start. When the time came for the middle group to start, Bira went off like lightning. He was, however, closely followed by Martin and Trossi. Bira was soon fourth in the whole race, and in Lap 3 he overtook Stuart-Wilton (M.G.) to take third place. He was very hard pressed by Martin, who was only 2 sec. behind. Dobson meanwhile had got the better of Trossi, so that three E.R.As. were now in the first three of their own group. Martin and Dobson were now right on Bira's tail. As Bira threw his car round a sharp bend in a controlled slide, Martin on the red E.R.A. would take the same corner with his car only a few feet behind him. Then Dobson's white car would come to the corner with a terrific shudder of sudden braking. The three cars straightened out and chased each other again. Thus at every corner the same struggle went on lap after lap, with the crowd frenzied with excitement and enthusiasm.

After five laps, or a third of the distance of the race, Bira was 33 sec. behind Goodacre (Austin), who had been given a start. The race continued at that ghastly pace, and as Trossi had driven his car to the absolute limit, the Maserati had to retire owing to some mechanical defect.

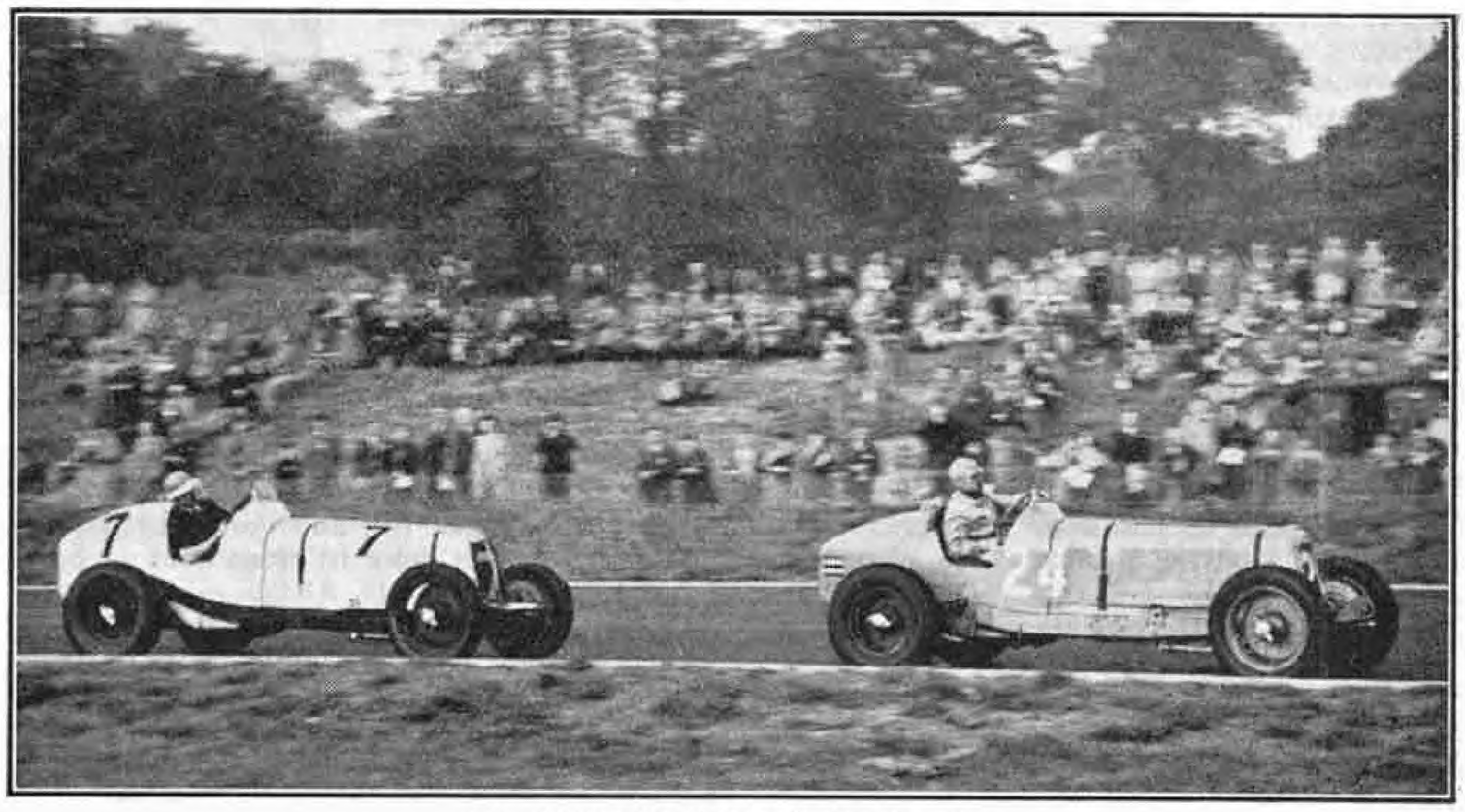
Lurani and Villoresi were still in the race, but they were outpaced by the three leading E.R.As. and real Italian opposition collapsed with Trossi's exit.

The pace the three young men were setting on that difficult and twisty circuit was such that they had to concentrate every ounce of strength and every bit of nerve on their driving. In such conditions a mistake was inevitable, and more than excusable. Thus poor Martin fell a victim to the strain imposed. He had been so bent on catching Bira and keeping ahead of Dobson that in the tenth lap he went into a corner too fast. Try as he might, he could not swing his car round the corner. The red E.R.A. went into a wild skid, while Dobson brilliantly slipped by and avoided hitting it.

With Martin out the race became a straight fight between Bira's blue and Dobson's white E.R.A. They had both passed all the other small cars and were surely reducing Goodacre's lead every lap.

There were now only five laps to go. Dobson was driving a truly inspired race and was clinging to Bira all through. Neither of them could afford to make the slightest mistake. The two cars rushed nose to tail past the replenishment pits where I was standing with the mechanics. The excitement was so great that I found it almost impossible to go on calmly with my work, that of filling the huge chart with the positions of all the cars and the number of laps they had covered. It was not necessary to give Bira any signal other than the number of laps he had covered, as he could see only too well in his little reflecting mirror that the white car was only a few yards behind.

As the two rivals disappeared out of our sight round the corner, we would look back to the hill, and about a minute later we would see occasional glimpses of them on the crest of the hill in between the trees. It was with relief that I saw our blue car still in front, but the white one was uncomfortably close. Then they were out of sight again as they disappeared behind the hill, while we looked to the corner known as Stadium Dip. After an interval they would appear tearing down, separated by a few yards. As they turned the corner, Dobson would leave his braking as late as he dared, and draw almost level. Bira, however, had taken the corner just as well, and Dobson could not slip by. The duel between these two was so intense that the rest of the race must have been overlooked. The problem was, could Bira stand the awful strain of being so closely (Continued on page 262)



Bira (24) leading Dobson (7) by a few feet.

Resignalling with Colour-Lights

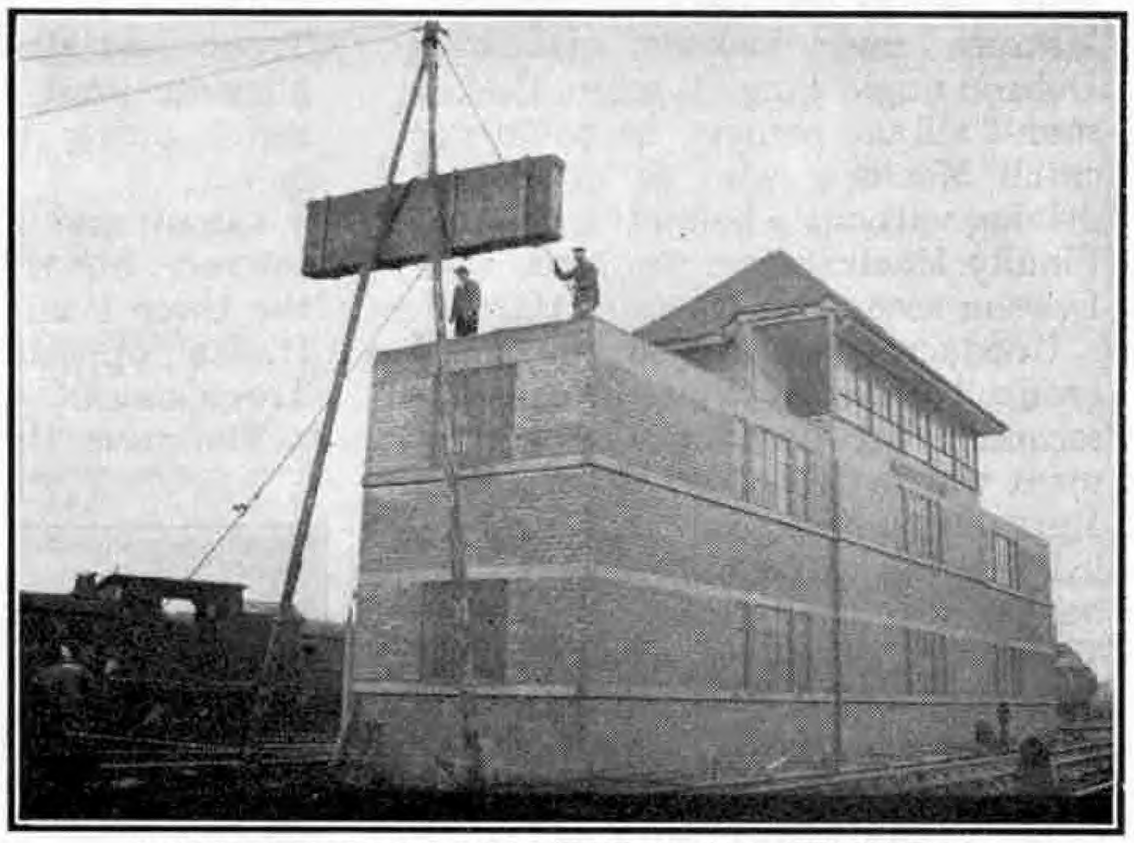
Interesting Changeover Work on the L.N.E.R.

By a Railway Engineer

AN interesting example of how a fast-running main line is signalled with modern day colour-lights is provided by the Northallerton–Darlington section of the L.N.E.R. It is a very busy stretch of line—double-track only for the bulk of its 14-mile length—and it carries, in addition to the direct East Coast traffic that has come north from York, a number of trains from the Leeds and Harrogate line, joining the main line at Northallerton. The *"Queen of Scots"* Pullman travels this way.

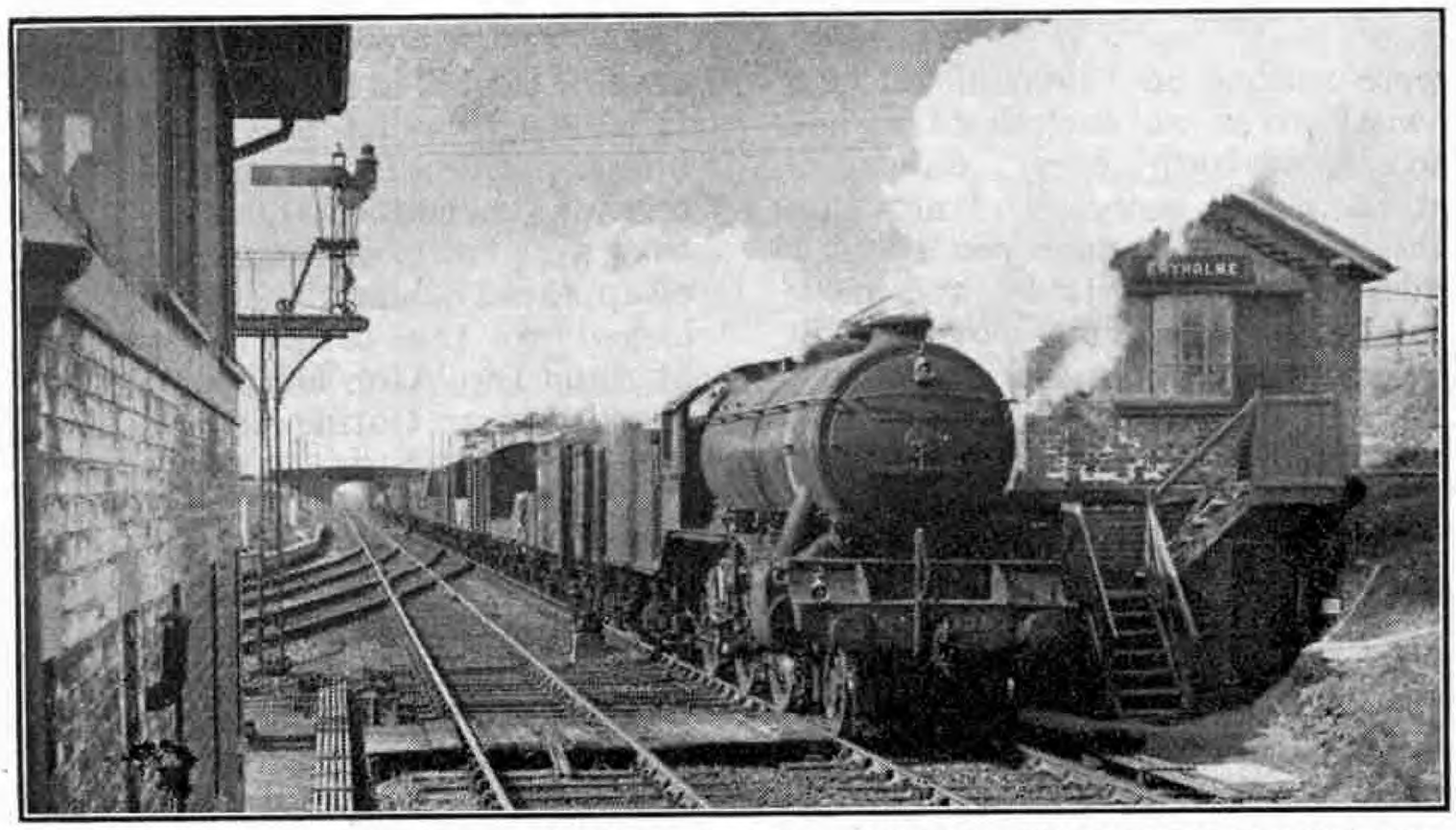
The new signalling was designed to give the best possible traffic facilities in the complicated layouts at each end, and over the 14 miles of veritable "racing" ground intermediately, to make things as favourable as possible for 90 m.p.h. streamliners and heavy freight trains alike. At the same time, by reducing the number of control points, each signal box looks after a longer stretch of line, and the signalmen can keep a closer watch on trains. Now, they know what is approaching much sooner than previously; they see just where it is from the illuminated track diagrams, and have time to make all arrangements for its undelayed passage through a junction.

The actual signalling scheme as prepared may be quite alright on paper, but its installation is another matter. The most intricate work involved was of course at the two ends, and activities could be concentrated there; but what of the intervening stretch? Modern colour-light signalling is continuous; on this line there are signals at ¾-mile intervals throughout, most of them in the open country, miles from any of the intermediate stations. Very few trains call at these wayside stations, and at the one signal box between Northallerton and Darlington, Eryholme Junction, there is no station at all. Clearly, if a great deal of time was not to be wasted the transport of men and materials to these outlying places was going to require very careful organisation. The problem was solved by the judicious co-ordination of road and rail transport; by the running of a regular lorry service, and supplementing this by a motor-cycle and sidecar, and private cars as required. Regular pick-up places, such as overline railway bridges, were established, and the work progressed very smoothly.



Hoisting up the Control panel into the new box at Northallerton.

Eleven signal boxes, each with mechanical apparatus, were previously used for working this stretch of line; these have now been replaced by three power boxes. The new concentration at Darlington is typical of what has been done, and it is notable especially on account of the interesting track layout. Bank Top Station lies just to the west of the main line. Non-stopping trains, such as the down *"Flying Scotsman,"* the *"Coronation,"* and some of the night sleeping car expresses do not pass through the platforms at all, and consequently all stopping trains have to cross over at both north and south ends. At the south end the layout is complicated by the divergence of the Tees-side line, over which there passes a heavy traffic. To the south of this junction there spread out a series of long running loops, on the up side. There are four of them, all parallel to the main lines, and they provide a useful refuge for up freight trains waiting until there is a sufficiently long interval between faster traffic to permit of their being sent away over the double-tracked section that begins about 1½ miles south of Darlington. The indiscriminate despatching of southbound freight trains would cause bad delays.



An up fast freight train passing between old and new signal boxes at Eryholme. The old box is behind the engine, which is No. 1397 of the well-known K3 class of 2-6-0s. Photograph by N. Wilkinson.

Two signal boxes on this refuge loop section have now been abolished, so that the signalmen at Darlington new south box preside over all these movements. The tracks are duly shown on the big illuminated diagram, and before any shunting or crossover movements can be done from these goods lines to sidings, or across the main line to a set of sidings on the far side, permission has to be obtained from Darlington; then the local point levers are electrically released. The main signals are all four-aspect, of the "searchlight" type, and the junctions are signalled by the striking position-light direction indicators. In these latter, if a train is to diverge from the main line, a row of five white lights pointing diagonally to right or left from the main signal shows the direction to be taken. For running into the station a different type of route indicator is used; this is of the so-called "theatre sign" type and consists of a large number of small electric lamps arranged on a black background. Various combinations of these many lamps can be lighted up, to make up figures representing the number of the platform into which the route is set.

In Darlington south signal box traffic is controlled from an all-electric locking frame containing 155 miniature levers. It is a very attractive-looking apparatus; highly finished steelwork, a handsome green casing, chromium-plated levers, and the brilliant array of lights on the indication panel make up a fascinating picture. The indication lights show whether the



Darlington South End, showing new signal box on left and main lines passing straight outside the station.

colour-light signals are showing danger or all-clear, and illuminated N and R stencil indicators show the position of each pair of points. The interlocking between the levers is done electrically; glass panels below the levers in front, and also at the back, reveal the moving contacts and the locking shafts. Below the locking frame there is a walkway that enables maintenance men to pass from end to end, and gives the easiest of access to all the wiring, terminals, and the electro-magnets.

On the ground floor of the signal box are the numerous electric relays, the fuse board—every wire coming into the cabin has its own fuse—the power supply switches, and, incidentally, about 100 miles of flame-proof wiring. A neat little brick hut close by contains the main power-supply switch-board, and stand-by power equipment for use in case of failure of the normal supply. The stand-by generator is driven by a Diesel engine that starts up automatically should the main electricity supply cease from any reason.

Returning now to the signalling itself, Darlington station provides a very interesting example of the arrangements that must be made at the place where mechanical semaphore signalling ends and colour-light signalling begins. A gradual transition is necessary, for one cannot pass straight from a semaphore arm that has only two positions to a light signal displaying any one of four aspects red, single yellow, double yellow, or green.

The full colour-light signalling begins at Darlington south box. The cabin controlling the junctions at the north end of the station is still largely mechanical, and here the home signal is a semaphore. Working in conjunction with it, however, are certain light signals, and the transition from one system to the other begins even farther to the north. The last purely mechanical signal is at Parkgate Junction, 1½ miles beyond Darlington north box; this is a plain two-position semaphore. Next comes a colour-light signal, also worked from Parkgate box, displaying red, yellow, or green as circumstances allow; the final one of the Parkgate signals introduces the fourth aspect—the double yellow—now only 1,000 yards short of Darlington north box. Last of all comes the semaphore home signal previously mentioned; this has fixed below it two colour-light units, so that a long-range "single yellow," "double-yellow" or "green" can be displayed when required.

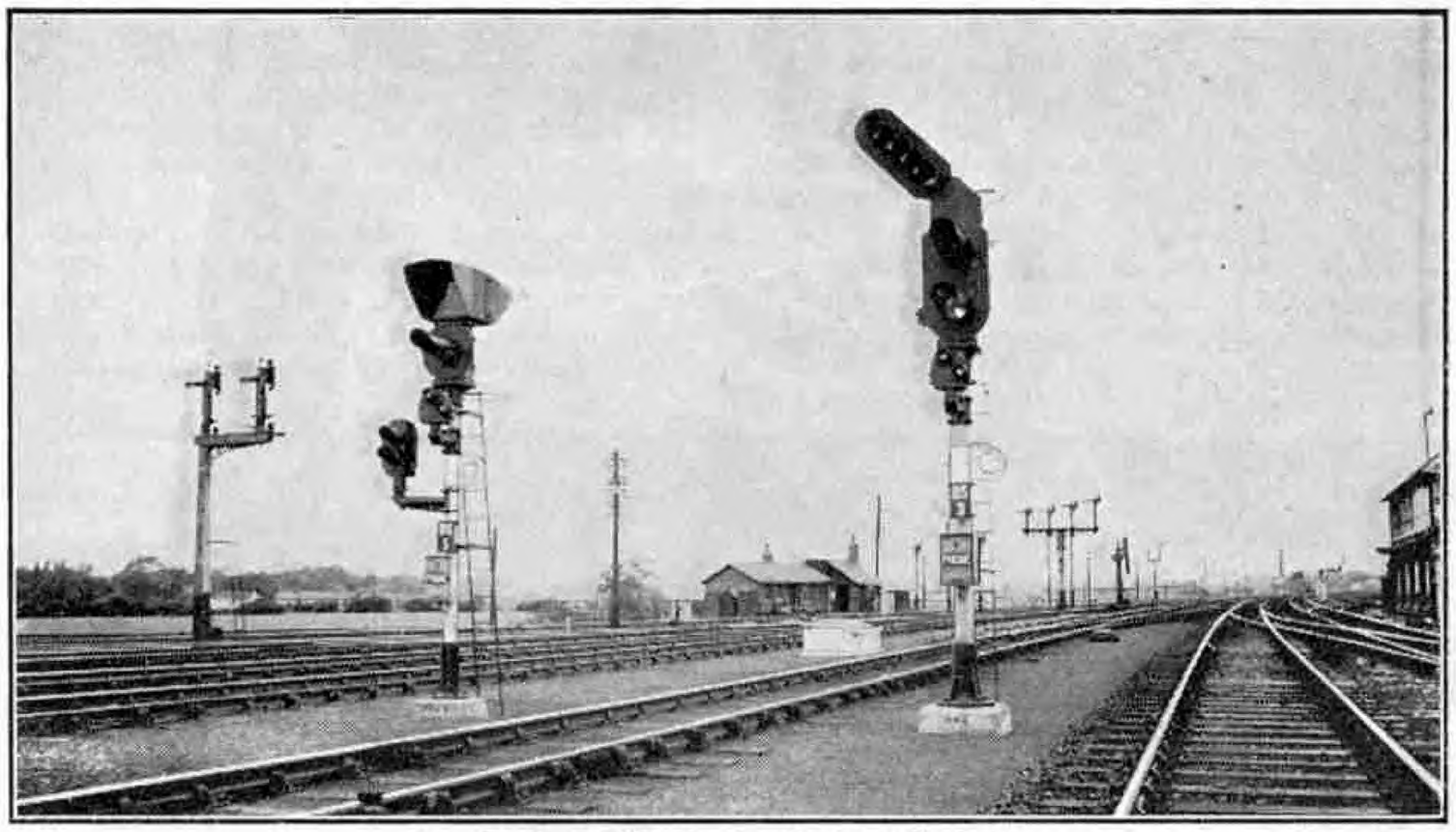
An interesting feature of the new signalling is the wide area displayed on the illuminated cabin diagrams. By means of the track indication lights oncoming trains are watched for quite a long time before they actually reach the area in sight of the various signal boxes. In the case of a north-bound train, visual indication is first received when she is some six miles south of Northallerton; the illuminating of nearer track lights, and the extinguishing of more distant ones vividly portrays her progress, until in a few minutes she comes into sight and roars past the box. Still her progress is recorded on the diagram, for the Northallerton control area extends to Wiske Moor points two miles to the north. There Northallerton sees the last of her, and simultaneously she appears for the first time on the Eryholme diagram.

The signalman at the latter box watches the train over seven miles of line before it actually passes; for 5¼ miles the signalling is purely automatic, yet the whereabouts of the train must be shown so that the man at Eryholme knows just how much time he has to make a conflicting move. There may be, for example, a local approaching for Richmond; to get on to the branch involves crossing the down main line. Can it be done without delaying the oncoming express? With ordinary block-working it might well be a "toss-up," in spite of the most careful co-operation between the signalmen; but with an illuminated diagram as comprehensive as those used in this new installation the man can judge things far more accurately, and better operating results.

I have mentioned the automatic section between Wiske Moor and Cowton station. In this section comes Danby Wiske station, where there are some points leading into a small goods yard. Two of the normally automatic signals, one on the down line and one on the up, are actually controlled though their respective levers usually stand pulled over to the clear position. Supposing a local goods comes along with a wagon to leave in Danby goods yard; to move the points the signal levers must be put back to normal. Now although visual indicators are provided to show if any trains are approaching, the man working the locking frame might, in a fit of thoughtlessness, put back the signal levers and reverse the points when an approaching train was too near to be able to stop; so an interlock is provided that prevents the signal levers being put right back when a train is nearer than two block sections away. I should explain that the actual signal changes to "red" the moment the lever is moved from the full reverse position, but until the lever is right back the points are not freed.

The bringing into service of such an installation requires a lot of careful planning; there was too much work for the whole 14-mile stretch to be changed over on one occasion, and with this particular job it was converted in four stages. For purposes of explanation one particular opening, that between Eryholme and Wiske Moor, gives a good idea of what is involved.

First of all a traffic notice is prepared, and circulated to all concerned in the operation of trains over the particular stretch of line. This work was begun at 5 o'clock on a Sunday morning, and the "notice" would give the times at which the Engineering Department have absolute possession of the running roads for point alterations, specify any special staff arrangements, such as the opening of any signal boxes normally closed on Sundays, and the need for station staff to be in attendance where ordinarily there are no Sunday trains. More important still for the safe working of trains are the temporary block signalling arrangements; on this occasion Croft Spa ground frame was operated as a block post, since for a large part of that Sunday (*Continued on page 262*)



New signals and directional indicator at Darlington.

Hunting for Hawk Moths

By L. Hugh Newman

HUNTING for Hawk Moth eggs is not as difficult as you may imagine, but first you must get familiar with the various alternative food-plants that the caterpillars will eat. You can find the bright green eggs of the Privet Hawk on ash, lilac, wayfaring tree, as well as the natural food-plant, privet. When you search the trees and shrubs in May or early June, remember that most Hawks prefer to lay their eggs on the undersides of the leaves.

The Poplar Hawk lays the largest egg of all the British Hawks. These look like tiny pale green seed pearls, as they are quite round, whereas most of the other Hawk Moth eggs are oval. You will find the Poplar Hawk eggs on any of the various poplars and sallows that grow in England.

Poplar Hawks are one of the most interesting to breed if you live in Southern England, as they are usually partially double brooded. By this I mean that some of the moths start emerging from the pupæ about the first week in August, and you can get pairings and raise another brood before the leaves begin to fall in late September.

This is the only species of Hawk Moth that you can watch through the complete life cycle during the Summer season. With all the rest you have to wait until the following Spring before your moths start to emerge.

The best way to find Poplar Hawks is to locate a row of young trees that have been planted as a screen in a garden, and have not grown very tall. Then all you have to do is to bend back the limbs carefully so that you do not snap them off, and turn the bough over so that you can glance over the whole of the underside of the leaves to see if there are any eggs attached to them.

If you have any low-growing bush apple trees in your garden, search the leaves in this way for the Eyed Hawk Moth eggs, as this moth often chooses these trees to lay her eggs upon, in addition to the more common sallow and willow bushes.

Lime Hawks lay their eggs on lime, but if there are no limes in the district where you live, it often pays to search the lower limbs of old elm trees. An alternative food-plant in captivity is birch, but you seldom find them feeding on this tree in the wild. It is interesting to note that if you find a brood of Lime Hawk caterpillars feeding on elm, you can transfer them to lime leaves, which they will readily eat; but if they have been reared on their natural food (lime) they will prefer to starve rather than change over to elm or birch.

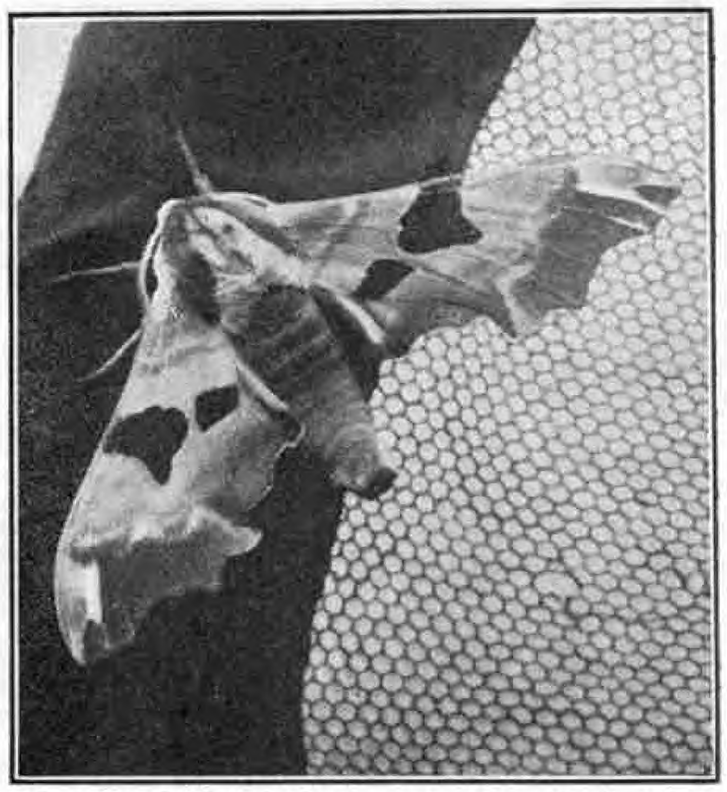
The Death's Head and Convolvulus are not really British Hawks at all, but occasional migrants that fly over from the Continent like many birds and a few butterflies. The eggs of both these Hawk moths are seldom found, as you can imagine it would be a most difficult task to search a potato field, where Death's Heads lay their eggs, and the convolvulus is one of the commonest weeds. Some years Death's Heads are quite common in certain districts, and if there are many of them in a potato field you cannot possibly miss them as they will strip a whole plant quite bare of leaves before they move on to the next in the row.



Opening a "sleeve" and showing a limb that has been stripped of leaves by feeding Hawk Moth larvæ.

The eggs of the Elephant Hawks are not easy to find either, but I have a method of my own for finding eggs of the Large Elephant Hawk. I know where its favourite food, the rose bay, which is sometimes called the "fire weed," or willow herb, grows by the acre in a clearing in a wood, and the Hawk Moths are quite common there.

Instead of looking at each leafy stem I run it through my fingers, and if there is an egg on the underside of a leaf I can nearly always feel it with my finger tips. You would be surprised how sensitive your finger tips can get if you "train" them to feel for the eggs or young caterpillars.



Lime Hawk Moth just emerged and drying its wings, the wavy edges of which give the impression of a curly leaf. Photograph by courtesy of Mr. Pentland Hick.

It is very difficult to distinguish between the Large and Small Elephant Hawks if you find them as eggs or small larvæ. The only way is to keep them on the food-plant you first found them on, and if the caterpillar goes on growing after it has reached about two inches, you will know it is a Large Elephant Hawk, as Small Elephants pupate about this size.

The Small Elephant will show signs of wanting to wander away from its food to find a suitable site to turn into a pupa when it reaches this size, but the Large Elephant will go on feeding and grow to almost twice the size before it wants to pupate.

Perhaps the best guide would be to give you the food-plants again, as the Small Elephant only feeds on ladies' and white bedstraw, whereas the Large Elephant will tackle a varied menu, including bedstraws, fuchsias, grape vine, virginia creeper, and evening primrose.

The Broad-Bordered Bee Hawk usually lays her eggs on honeysuckle, but occasionally you can find them on snowberry bushes; and the female always chooses the underside of the leaf to deposit her egg. This is the easiest Hawk Moth caterpillar to find in its young stages if you know the following tip. The caterpillar, on hatching from the egg, always commences its first meal by eating little round holes out of the honeysuckle leaf—as though they had been peppered with a shot gun. And so you can be sure there is a Bee Hawk caterpillar on the spray of honeysuckle you are searching if you find one leaf with holes in it.

The Narrow-Bordered Bee Hawk lays only on the devil's-bit scabious, and as this is a widely distributed weed I cannot give you any hints on how to collect eggs, except that knowing a locality where they breed helps enormously.

The Humming-bird Hawk is a regular migrant like the Death's Head moth, and so if you know of a place along the South Coast where bedstraw grows in large patches, you always have a chance of turning them up in June. There is no flower that the Humming-bird Hawk moth loves more than pink valerian, which is a favourite with butterflies as well.

At a little seaside place called Kingsdown, in Kent, there is a strip of stony beach several miles long where this flower grows like an enormous pink carpet. And what is

even more wonderful, in the space where the valerian does not grow there are usually large patches of bedstraw.

I have never visited this place in July without picking up some of the caterpillars, or in September and October failing to see dozens of the Hawk Moths hovering among the flowers, looking like real Humming Birds, with their wings beating so fast that they make the insect look blurred. The impression is strengthened as the moth stretches out its long tongue and probes it deep into the heart of the flower in search of nectar, as it looks very like the long beak of this bird when it is engaged on the same occupation.

My earliest memory of hunting for Hawk Moths was the first time my father took me out searching for Lime Hawk caterpillars on the lime trees near our house. Armed with an electric torch and a long pole with a razor blade fixed firmly on one end, we set off. My father shone his lamp up into the lime trees and twisted his head this way and that to catch a glimpse of a caterpillar. Suddenly he shouted: "There's one!" Looking high up into the branches I spotted a fat green caterpillar lying along the edge of a leaf, standing out sharply against the lighted background. With a flick of the wrist my father snipped off the leaf by its stem, and the caterpillar fell at my feet. And so we went on, cutting off the leaves with caterpillars clinging to them, and it was my job to pick them up and pop each one into a chip box.

This is quite a good way of collecting many of the Hawk larvæ, but during war time I am afraid your local warden would not allow you to use a torch for this purpose! It is not so easy to find them during the day as the markings on their green bodies resemble the veinings of the leaves, especially when they are almost full grown.

I think the only sensible method of breeding Hawk Moths is to "sleeve" the caterpillars out of doors on a limb of their favourite food. It is quite easy to make a sleeve from a strip of butter muslin by sewing the two sides together so that it forms a bag open at both ends. Slip one end over a branch, just as you would slip your arm into the sleeve of your coat, and when it is far enough down tie it tightly with a piece of thick string. Now tumble your caterpillars inside and then tie up the top end of the sleeve in the same way. There is no healthier way of keeping your Hawk Moths than out in the open on the growing food. You must be careful to see that they do not go hungry; they soon strip all the leaves off a bough enclosed in a sleeve, and when they do you must transfer them to a fresh bough by picking them off the twigs, one by one, taking care not to damage the hind claspers or "feet" of the caterpillars.

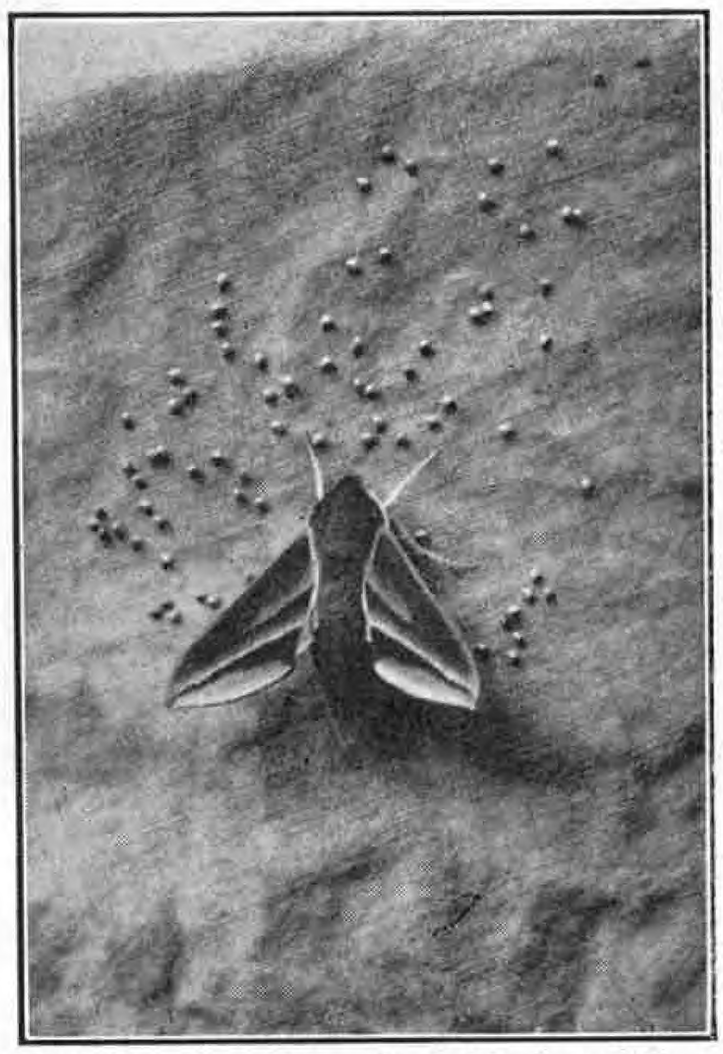
On my butterfly "farm" we often envelope a complete tree, 20 ft. or more high, in an enormous "sleeve," so that it looks like one of the balloons that encircle many of our large towns at the present time. Sometimes we keep as many as six to seven hundred Hawk Moths feeding in one of these "giant" sleeves, and you can hear the caterpillars tearing at the leaves from quite a distance away.

You must be prepared for some hard work when the caterpillars are full fed and ready to pupate. The best thing to do is to get a small tea chest and then spread a few inches of light soil—leaf mould is good—on the bottom, and cover this with a thick layer of moss and dried leaves. The first thing in the morning, at mid-day, and the last thing at night, open your sleeve at the end nearest the ground and look for "semies."

I always call them "semies" as some of them are often so impatient that they partially turn into pupæ before you can get them into the boxes you have so carefully prepared. Do not be alarmed if you notice the skin of the caterpillar has turned to a dirty brown colour when it is full fed. This is not disease, but a wonderful provision of Nature—a protective colouration. You can imagine how conspicuous an enormous Hawk Moth caterpillar would look crawling down a tree-trunk to earth, if it were brilliant green. But just before it is ready to come to earth it takes on this darkish hue, and on its journey down the trunk it passes unseen by birds who are its chief enemies.

After about a month, carefully dig up your Hawk Moth pupæ, by running the earth through your fingers and feeling in the moss. I have always found the best way to keep them healthy during the long Winter is to place them in a flat clean tin with the lid closed. On no account bury your pupæ in earth or sawdust as many people do, as it is fatal. In Nature the caterpillar makes a smooth cocoon in the earth so that no weight actually rests on it.

In the Spring, about the first week in April, you should take your pupæ out of the tin and lay them on the top of some light soil and cover them with damp moss. Remove the moss about once a week and damp it with lukewarm water, and then replace it again. Just before the moths are due to emerge in May, place a number of small twigs standing upright in your cage, so that the moths emerging from their pupæ can at once find a suitable foothold to climb up and expand their wings. If you follow these simple instructions carefully you should have no losses with your Hawk Moths in captivity.

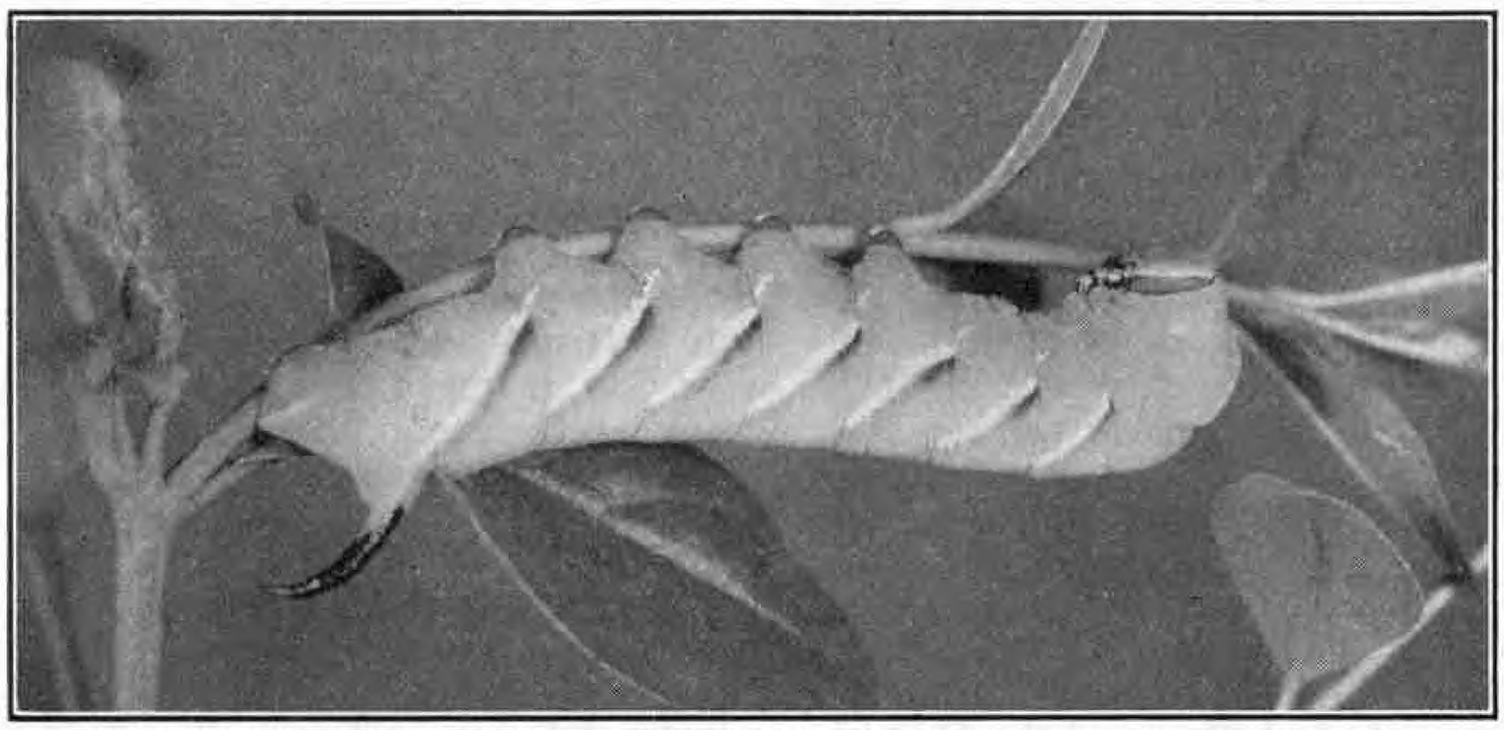


An Elephant Hawk Moth with a batch of eggs laid on a piece of muslin.

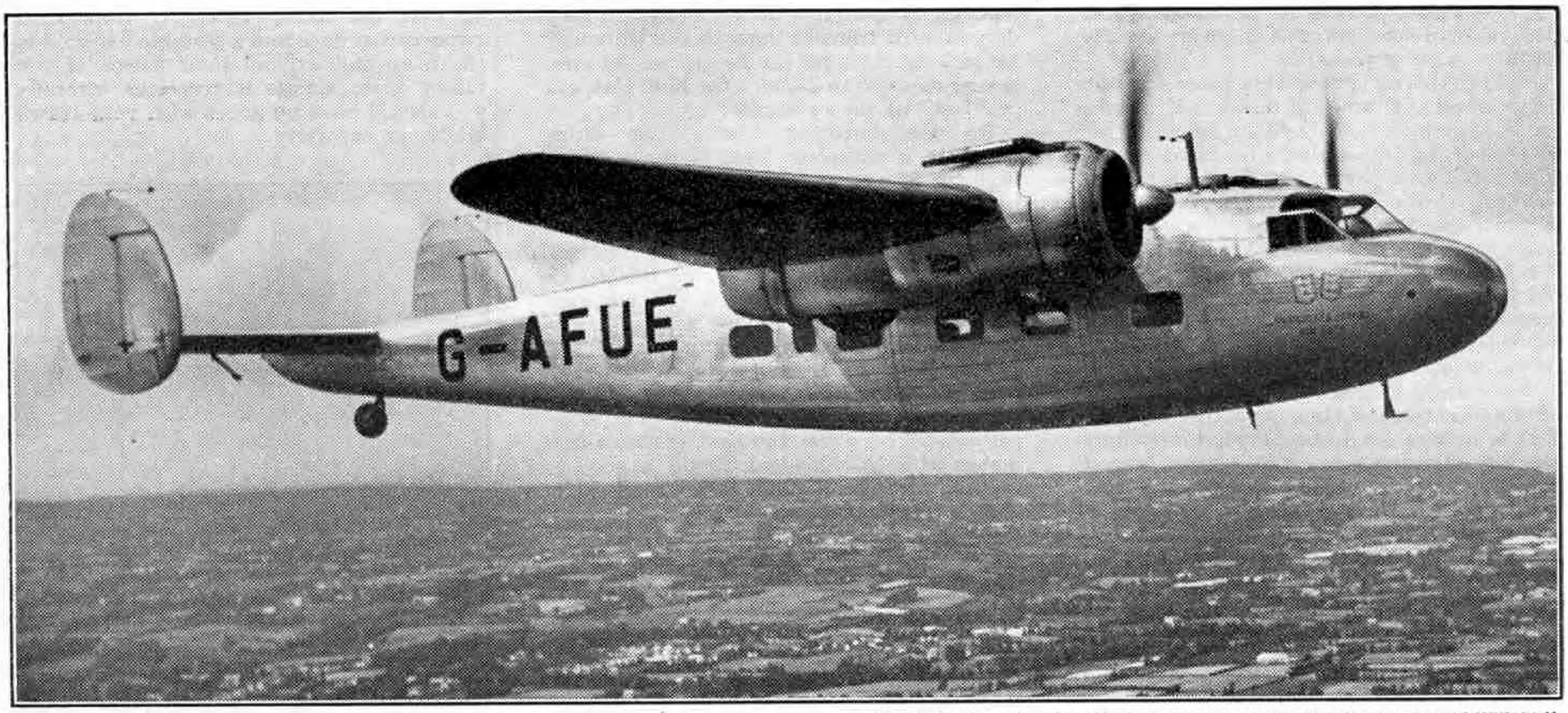
I have a very vivid memory of collecting Hawk Moths abroad, while on a Summer trip to Finland a few years ago. I was living in a lovely wooden chalêt deep in the pine forests at the time, and of course I spent a good part of each day looking for Pine Hawks, which are such rare moths in England. You can usually find them resting on the tree-trunks in the localities where they occur in this country, but somehow I could never seem to find any in the district where I was living—perhaps because there were such thousands of tree-trunks to look at in those forest regions.

I had almost given up hope when one evening at dusk my luck changed! My host invited me to stroll round the garden after dinner, and rounding a bend I saw the most remarkable sight I can ever remember in connection with moths at night. An enormous trailing white clematis hung over a verandah, looking rather like a white shawl flung carelessly by someone. But what attracted my attention was the moths that were buzzing and humming all around it. I don't ever remember seeing so many together in my life. Of course quite a number of them were Pine Hawks, and within a few minutes I had netted about a dozen for my collection, as well as many others that were quite new to me. Some of you may be interested to know that my collection of Fininsh insects was purchased by the late Lord Rothschild, and went into the famous collection at Tring Museum. On his Lordship's death this was presented to the Nation, and so I am rather proud to think that my collection of Finnish insects has become part of our national heritage.

I had one other piece of luck on that memorable trip to Finland. Just before I was due to return home I found several of the rare Bedstraw Hawk Moth caterpillars feeding on some bedstraw growing by the roadside!



The Privet Hawk Moth caterpillar is bright green, handsomely banded with purple and chalk white stripes. The glossy black pointed "tail" is the "trade mark" of the Hawk Moth caterpillar.



The D.H. "Flamingo" of Jersey Airways. Photograph by courtesy of "Flight."

The de Havilland "Flamingo"

Features of Britain's Latest Air Liner

THE majority of aircraft firms in this country are now engaged entirely in producing military machines, but the few companies still partly devoted to civil aircraft production are doing good work in keeping British civil machines before the world. The well-known de Havilland Aircraft Co. Ltd., of Hatfield Aerodrome, has set a good example in this respect, and their latest and 95th design, the D.H. "Flamingo" Civil Transport, is now in production.

The first of these machines is illustrated at the head of this page. It was test flown a little over a year ago, and later was thoroughly tried out under actual operating conditions when it was put into service by Jersey Airways on their London-Guernsey-Jersey air service. The machine proved to be a great success, reducing the previous journey time and appealing strongly to passengers by reason of the comfortable travel it provided. Other "Flamingos" have since been produced, and some of them, flown by pilots of the Communications squadron of the R.A.F., have been engaged in maintaining necessary communications between this country and the R.A.F. and B.E.F. in France.

The first "Flamingo" was fitted with two 890 h.p. "Bristol" Perseus XIIc sleeve-valve engines, but those now leaving the de Havilland factory have two engines of the new Perseus XVI sleeve-valve type, and D.H. Hydromatic full-feathering, constant speed airscrews. The new airscrews have improved the "Flamingo's" performance on one engine in respect of rate of climb, ceiling, and level speed, and both engines and airscrews have improved the all-round efficiency of the machine. These benefits have enabled the all-up weight to be increased by 600 lb. to 17,600 lb., and as the feathering airscrews weigh only 100 lb. more than the constant speed type previously fitted there results a valuable increase of 500 lb. in payload.

When fitted with the new "Bristol" Perseus XVI engines the "Flamingo" has a top speed of 239 m.p.h. and a cruising speed of 200 m.p.h. With full load and aided by the wing flaps it can take off after a run of 312 yd., and it can climb at the rate of 1,470 ft. per min. The absolute ceiling or greatest height to which the machine can climb is 22,200 ft. The landing run required is 325 yd.

The D.H. "Flamingo" is an all-metal, high wing monoplane. This form of construction was chosen on account of the aerodynamic advantages obtained from an unbroken top surface of wing, and also because by merging the wing into the top of the fuselage a wide and lofty cabin is obtained that gives ample room and greatly helps loading by centring the payload near to the centre of gravity. The high wing arrangement is popular with air travellers too, as it enables them to enjoy a perfect panoramic view from any of the wide cabin windows, and it provides very welcome shade when the machine is flying in tropical sunshine. It also enables the fuselage to be nearer the ground than is practicable with a low wing machine, and this in turn makes possible a low doorway to the passenger cabin. In the "Flamingo" the doorway is only 2 ft. 3 in. above the ground, and it is reached by a couple of low steps.

Normally for main line duty the "Flamingo" carries 12 passengers and a crew of three, baggage, mail, and freight, and thus loaded it can be employed on long-distance air routes which have refuelling facilities within its range of 1,345 miles. For operating over shorter routes, such as internal and "feeder" line air services, it can be equipped to carry more passengers, and alternative internal arrangements, including changes in the luggage space, provide for 14, 17, or 20 passengers. The wide and lofty cabin is also ideal for conversion into a sleeper coach. The pilot's cabin is large enough and is laid out for two pilots, and a radio operator and his equipment.

The Royal Air Force in Action

Thrilling Stories of Air Battles

RECENT successful air operations have shown that the Royal Air Force has entered on the second six months of the war as it did the first—with "tails well up." There have been carefully planned and sustained attacks on the German air bases at Sylt, more long-distance reconnaissance flights far into the interior of Germany, and more successes against isolated enemy aircraft attempting reconnaissance flights in the northern part of Britain. Engagements in France by British fighter aircraft against superior forces of the enemy have given further proof of the skill and daring of R.A.F. fighter pilots. In those air battles several German reconnaissance aircraft and their Messerschmitt fighter escorts were shot down or driven off. Accounts of such engagements make thrilling reading, and a few of them are related in this article.

The first story comes from France, and tells how a German Dornier Do 17 bomber was defeated early this year.

Three miles high above the Allied line in France a British Hawker "Hurricane" fighter was alone on patrol. Puffs of anti-aircraft fire in the east warned the pilot of the approach of enemy aircraft, He made for the spot, and saw the German bomber heading towards him. The "Hurricane" closed in to the attack, and as the enemy turned the British pilot opened fire at long range. The Dornier replied, using tracer bullets and firing from his gun below the fuselage. A lucky shot hit the "Hurricane," and the pilot was forced to break off the action. He landed safely on his own aerodrome.

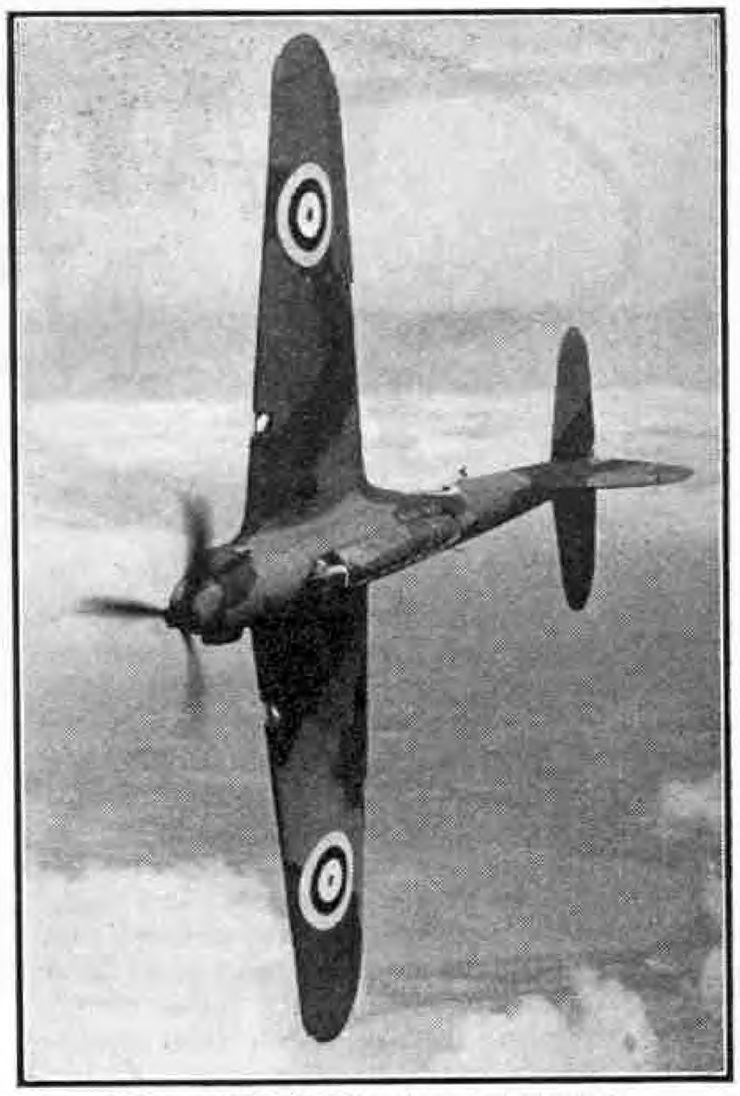
Meanwhile the ground air defences had been busy, and a message from a French observer post had sent two more "Hurricanes" to the attack. They climbed rapidly, and pursued the Dornier as it made upward towards the clouds. Holding his fire until well within range, the pilot of one of the "Hurricanes" fired a succession of accurate bursts, and smoke streamed from the Dornier's port engine. He then renewed the attack, and held a steady fire on the enemy until within a few yards' range. The Dornier banked steeply to the right as the burst went home, then spiralled downward, emitting white and black smoke. It crashed to earth in the middle of a small French village.

The odds are probably about 100 to 1 against the presence near our coasts of a German raider when a Fighter Command pilot is sent up on patrol for the first time. The hundredth chance came off, however, with one young Volunteer Reserve officer. On 27th February this year he was a pilot in a squadron that had not yet had the luck to fire a shot in battle; and with the two other "Spitfire" pilots of his section, he had been up for nearly an hour from his Scottish Fighter Command station.

Suddenly he heard his leader giving him orders on the radio telephone. As he entered the low cloud-banks to take up his position he saw what his leader had seen first—a Heinkel cruising quite slowly over a merchant ship 3,000 yds. away. For less than half a minute he raced after his leader, while the German machine fled towards the clouds. At one moment he thought he had seen the last of it. His leader, plunging into cloud, lost the enemy, but the Volunteer Reserve officer was lucky. The bottom of the cloud-bank through which he flew was thinner, and when he came out there was the Heinkel again, with the third "Spitfire" of the section on its tail.

The two "Spitfires" attacked in turn. The Volunteer Reserve officer fired his eight guns in short bursts, and as he made his second and last attack he could see the German top rear gunner still firing from his turret. He could also see smoke and flames pouring from the engine of the Heinkel, as the machine descended into the sea off the Firth of Forth.

The Coastal Command have had many opportunities of tackling the enemy. On one occasion two R.A.F. aircraft of this command were flying in formation on reconnaissance patrol when one of them sighted a German flying boat attempting to carry out reconnaissance off our coast. The British aircraft warned its companion, and the two formed up for attack. They dived in turn on the Dornier, getting in bursts of gunfire on the enemy's engines and fuselage. The Dornier made a steep turn so as to bring both front and rear guns into action.



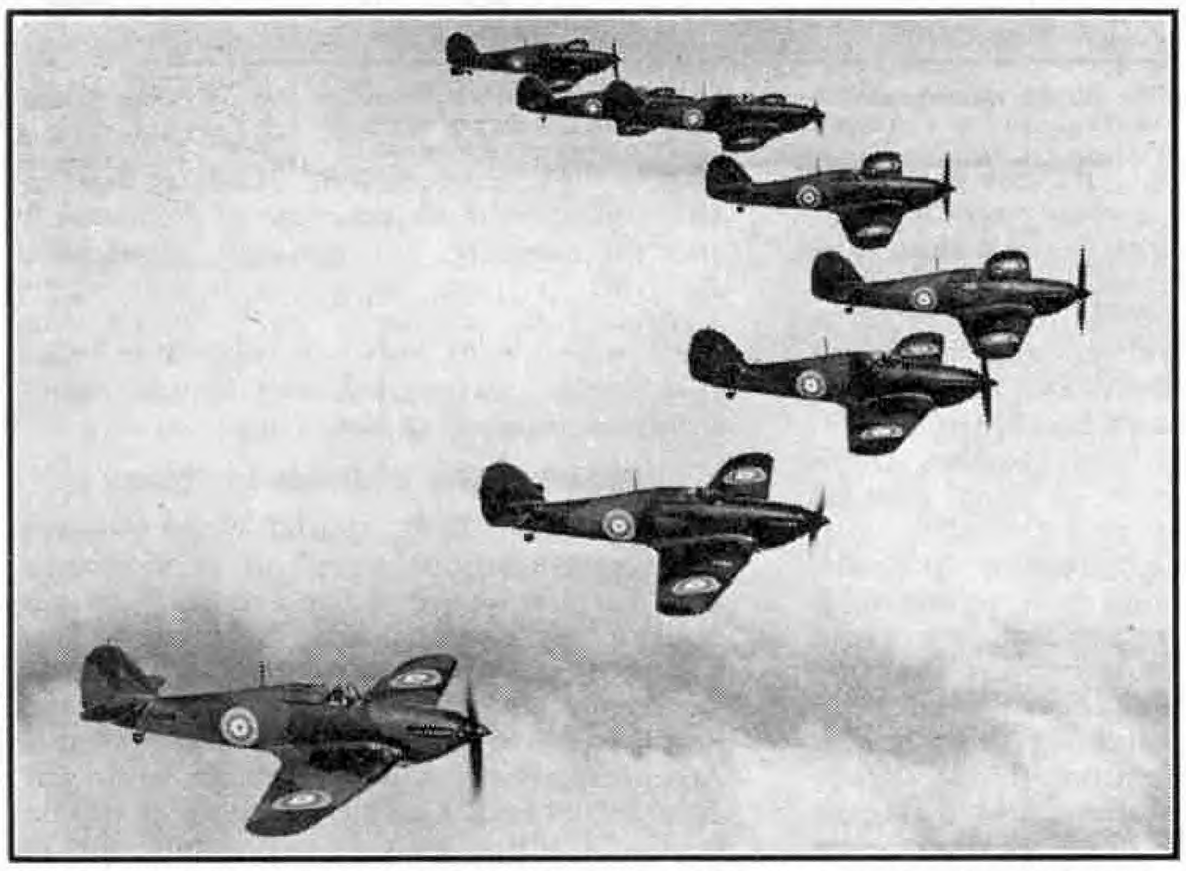
A Fairey "Battle" Bomber manœuvring.

The two British aircraft climbed into position for further attacks. One dived head-on to the enemy, landing a burst of fire into his starboard wing, and the other followed up with a steep dive from behind, firing continuously until within a few yards of the Dornier and raking it at point blank range. With blue smoke streaming from his engines, the Dornier, out of control, dived into the sea, and sank soon after the crew had taken to their dinghy.

Enemy submarines as well as aircraft have fallen victims to the efficiency of pilots of the Coastal Command. Hunted unceasingly by R.A.F. aircraft, German submarine commanders have now developed a "bolt-hole" technique. Whenever they break surface they maintain a constant crash-dive watch, using both visual and aural means to detect the approach of British aircraft. At the first indication of danger the alarm is sounded, the conning tower hatch is clamped down, and the submarine immediately submerges.

One enemy submarine recently encountered was riding on the surface when it was sighted by a reconnaissance aircraft of the Coastal Command. The U-boat was too far off for the crew to hear the aircraft engines. The pilot, therefore, climbed into the clouds and kept them between his machine and the submarine as he approached. Before coming out of the screen he throttled right back so that there would be less chance of being heard. Then having got into position, he pushed the control stick forward and dived to the attack.

So vigilant was the Germans' crash-dive watch, however, that the presence of the British aircraft had been detected, and when the pilot dived the submarine was already submerging. Less than 30 sec. after the conning tower had disappeared beneath the water, the first bomb was dropped from a low altitude on the course of the submarine. It entered the water about 30 yd. ahead of the foaming trough left on the surface when the U-boat dived. The explosion caused a tremendous upheaval, and the sea was immediately blackened with thick oil.



Hawker "Hurricanes" of an R.A.F. Fighter squadron flying in formation. The photographs on this page are by courtesy of "Flight."

RAILWAY NEWS

Mobile Railway Workshop Train for the B.E.F.

The illustration on this page shows soldiers at work in a mobile railway workshop train, the first of its kind, which has just been completed by the Southern Railway. It will be followed by others, and has been provided for the Ministry of Supply for use with the British Expeditionary Force in France. In these trains service repairs will be carried out on sites in forward areas instead of at base depots, which may be many miles away, and so the time during which vital equipment is out of condition will be considerably reduced.

Each workshop unit consists of three covered vans, modified to suit the requirements of the French railways. There will be doors providing for inter-communication throughout the train, and living quarters for the staff will be added when the units reach their destination overseas.

The three vans contain the power plant, machine tools and stores respectively. The power plant, which is housed in a 17 ft. 6 in. van, consists of a Diesel engine directly coupled to an alternator. The Diesel engine is of the four-cylinder vertical type, running at 1,000 r.p.m., and the entire set is designed for a continuous output of 25 kW. The supply is of 220/440 v. and 50 cycles. There is a total fuel storage capacity of 228 gallons. A storage tank of 25 gallons capacity is installed for cooling water make-up purposes, and there are arrangements for the provision of hot water circulation.

A battery of 25 amp.-hr. capacity is accommodated under the van for general lighting purposes at 24 v., and a transformer is installed to give a lighting supply direct from the mains when the set is running. In addition an external supply can be taken when the unit is at a place where a local supply is available.

The workshop is a 32-ft. van modified to allow the sides to be hinged up in sections to give a clear working space, and to provide shelter awnings as required by weather conditions. It is equipped with an 8½ in. centre lathe, a shaping machine, a power drilling machine, a bench type drilling machine, a tool and twist drill grinder and a mechanical hack-saw. Other plant installed includes a screwing machine, a 20-ton hydraulic press and three jib cranes, each of one ton capacity, for lifting and swinging heavy articles into the workshop. Plug points also are provided to enable a motor-driven field forge and portable electric tools to be used, and these are provided with sufficient lengths of flexible cable for working in the vicinity of the workshop. In addition to general lighting, adjustable lighting fittings are carried from the roof over each machine tool and there are plug points for hand lamps.

Fine Wartime Running on the G.W.R.

An excellent example of locomotive performance under wartime restrictions was provided by a recent journey on the Paddington-Bristol main line of the G.W.R. A load of 367 tons tare, and 400 tons with passengers and luggage, would not ordinarily provide a very stiff task for a "Castle" class 4–6–0. With speed limited to a maximum of 60 m.p.h., however, and the probability of delays from special traffic, it often requires first rate enginemanship if time is to be kept, even on the slow schedules of to-day.

On this particular occasion the driver of No. 5025, *"Chirk Castle,"* getting the right-away punctually at Paddington, had no need to hurry at first, as 45 min. are allowed for the 36 miles to Reading. Nevertheless speed picked up, after a leisurely start, to a good even mile-a-minute average from Southall onward, and Slough, 18.5 miles out, was passed in 23¼ min.

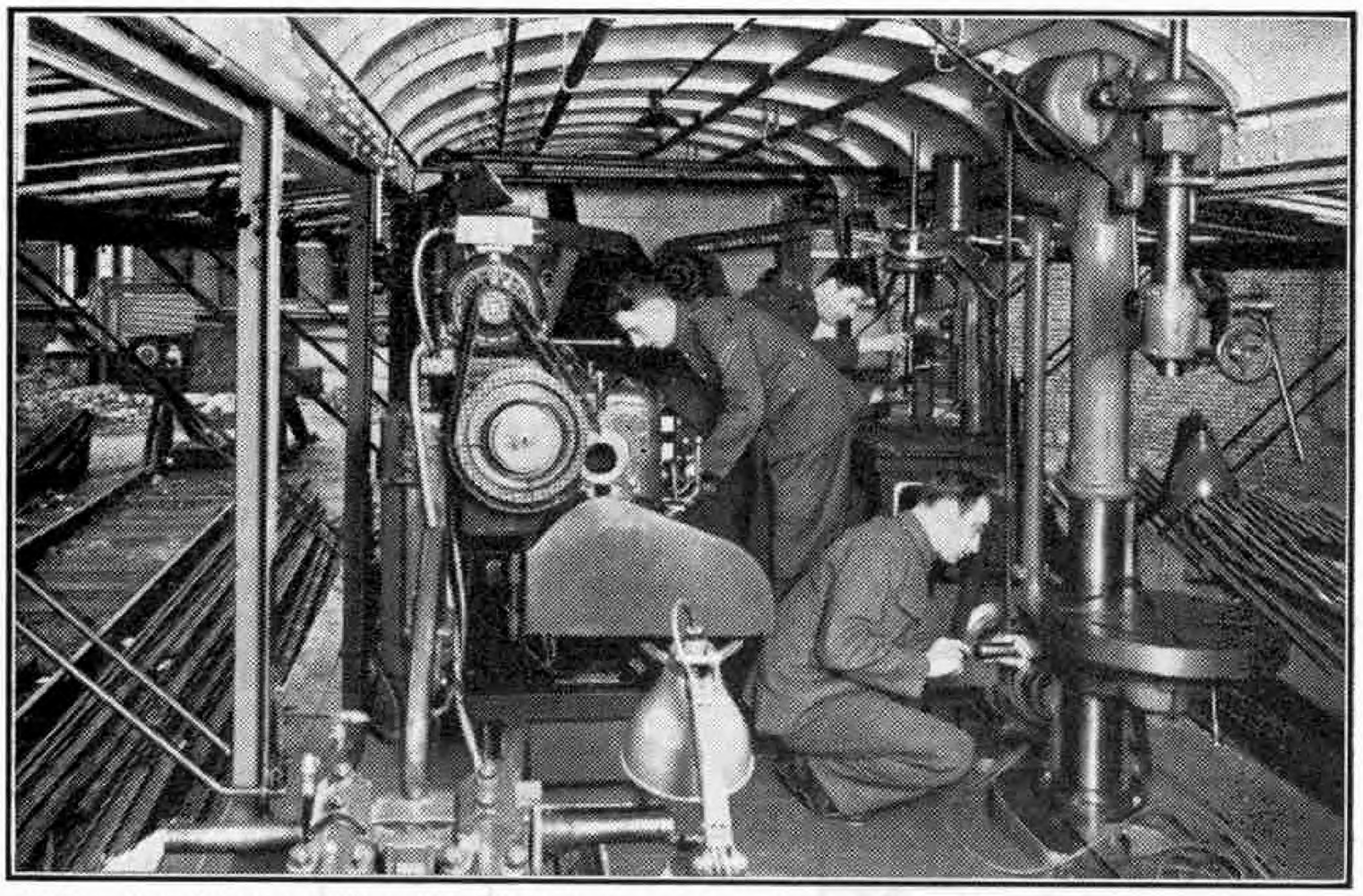
After passing Burnham Beeches there came a whole succession of signal checks. The down slow line was crowded with trains of coal empties, returning to South Wales, and the express was following a train of milk empties, which for some distance had to be kept on the fast line. From Twyford *"Chirk Castle"* got the road, and accelerated quickly to 60 m.p.h. before stopping at Reading. Those delays had cost 7 min. in running, but owing to the good start and brisk recovery the arrival was only 4 min. late.

Heavy station work kept the train nearly 2 min. longer than scheduled at Reading, so that the departure was 6 min. late, and a long and severe slack for permanent way work at Pangbourne caused a further loss of 3 min. Then came a very splendid recovery. On account of the check the 8.7 miles from Reading to Goring took 15¾ min., but *"Chirk Castle"* was then doing 51 m.p.h. This speed increased rapidly to the limit, and the driver then continued, as fast as the regulations permit, all the way up the gradually rising gradients from Didcot onward. Speed was for the most part fractionally above 60 m.p.h., and the 26½ miles from Cholsey to the 75th mile post were covered in 25¾ minutes.

This enterprising work regained all the lost time, with a minute to spare. Instead of the 53 min. booked for the 41.3 miles from Reading to Swindon, *"Chirk Castle"* and her keen crew made a net time of only 46 min., 7 min. under schedule. This run was all the more praiseworthy in that the maximum speed limit was so faithfully kept, achieving for all that a fine start-to-stop net average of 54 m.p.h. O. S. Nock.

Railways Own 11,000 Horses

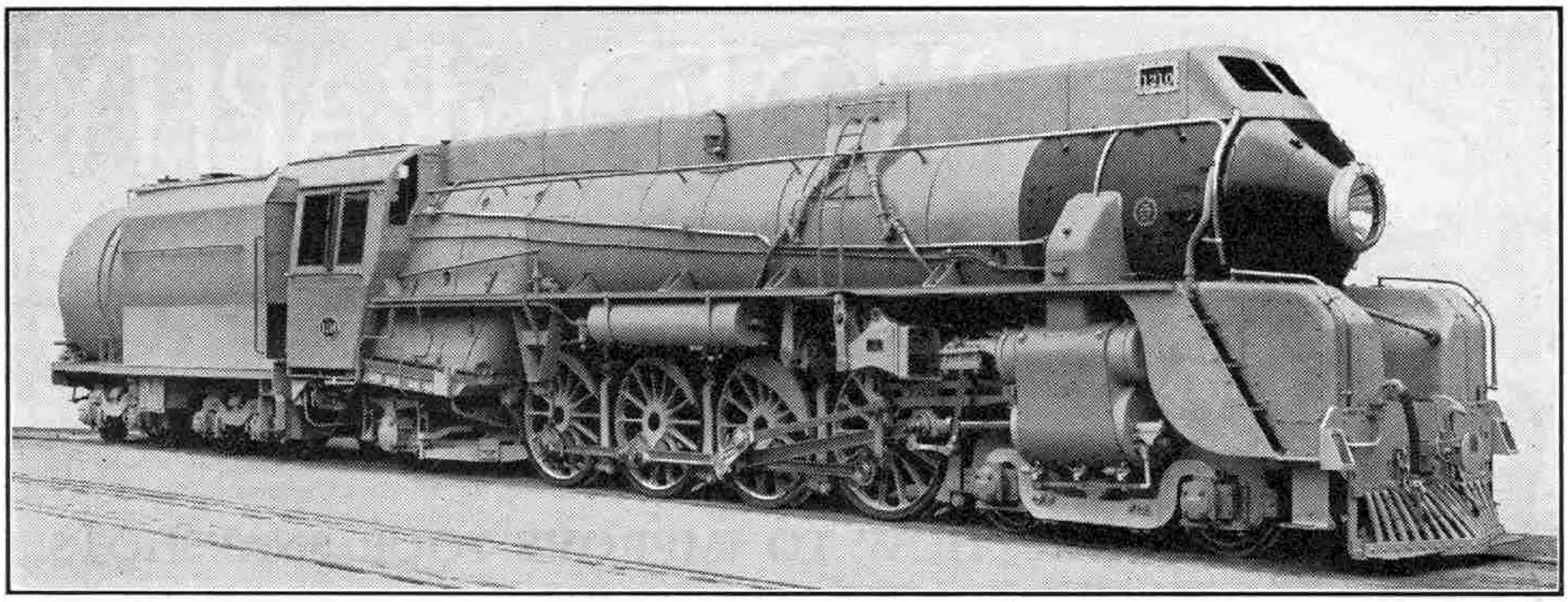
Railways are the largest users of horses in Great Britain, the total number owned by them being about 11,000. Some 300 are employed in shunting yards, sidings and depots for placing wagons. Most are used in the collection and delivery of goods and parcels, however, and are still found best for this purpose in many areas where streets and entrances to premises are narrow and calls are close together. Wartime petrol restrictions add to the value of horses in work of this kind.



Soldiers at work in one of the mobile railway workshops built by the Southern Railway for the use of the British Expeditionary Force in France. Photograph by courtesy of the S.R.

Producer Gas Railcars in France

Three steel 70 ft. double-bogie railcars using producer gas as fuel are in service in the Western region of the French National Railways. The gas is obtained from charcoal or wood burned in a vertical producer, and the gas drives a Panhard sleeve-valve engine with gear-box and cardan shaft drive. The cars can be driven from either end. Each are capable of speeds up to 75 m.p.h. Seating is provided for 54 passengers and there is standing room for 45 more.



One of 40 new light 4-8-2 locomotives built for The New Zealand Government Railways by the North British Locomotive Co. Ltd., Glasgow, to whom we are indebted for our illustration.

New 4-8-2s for New Zealand Railways

The upper illustration on this page shows a light 4–8–2 locomotive that has been built by the North British Locomotive Co. Ltd., Glasgow, for the New Zealand Government Railways. Altogether 40 of these engines have been completed. They are known as the "J" class, and have tenders of the double bogie type with cylindrical tanks. They are of unusual form, as our illustration shows, a modified type of streamlining being incorporated in the design. They will be used for working mixed traffic on the New Zealand Railways, the standard gauge of which is 3 ft. 6 in.

The cylinders of the new locomotives are of 18 in. diameter and 26 in. stroke. The coupled wheels have a diameter of 4ft. 6in. Total heating surface, including the superheater, is 1,752 sq. ft., and the grate area 39 sq. ft. The working pressure is 200 lb. per sq. in., and the tractive effort at 85 per cent. of the working pressure is 26,520 lb. The tender has a water capacity of 4,000 gallons and holds 6 tons of fuel. The total weight of engine and tender in working order is 109 tons.

The locomotives were shipped fully assembled, 30 being delivered to Wellington and 10 at Lyttleton.

American Train's Oscillating Headlamps

In addition to the ordinary headlamps carried by trains in the United States, the "Rocket" Diesel-electric flyers of the Chicago, Rock Island and Pacific Railroad are now equipped with the Mars headlamp, an oscillating headlight that has been developed in the U.S.A. for the use of fire engines, police cars, and ambulances. This throws a beam of white light that moves in the path of a figure "8." At a distance of 2,000 ft. the swinging beam flashes 750 ft. on each side of the track and 1,000 ft. vertically upward, and in clear weather it can be seen from 7 to 20 miles away.

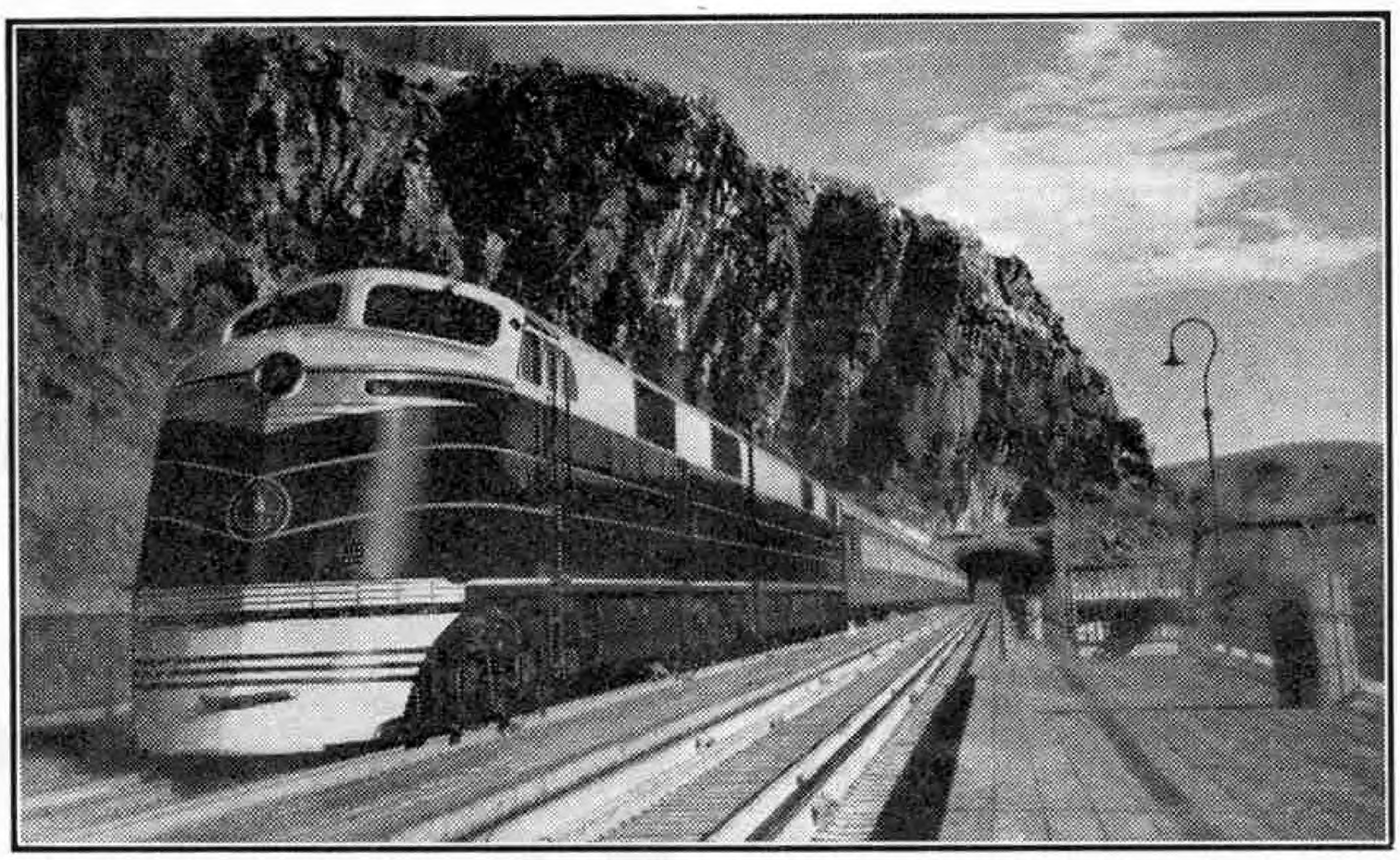
The new lamp is of special value on curves, where the beam of the ordinary headlamp illuminates only a very limited length of the track ahead. Its oscillating light can be dimmed and steadied, so that drivers of approaching trains are not dazzled. Cutting across the sky and at the side of the line, it has been found to have a remarkable effect on motorists in encouraging greater care on their part.

Diesel-Electric Locomotive's World Record

When Diesel-electric locomotive No. 56 entered Washington with *"The Capitol Limited"* of the Baltimore and Ohio Railroad, this locomotive had completed 365 consecutive daily runs between Chicago and Washington, covering on these journeys approximately 280,000 miles. This is believed to be a world record for continuous locomotive performance.

The Diesel-electric locomotive that accomplished this remarkable year's service is shown in the lower illustration on this page. Its daily run of 772 miles was made at the average speed of more than 56 m.p.h. over heavy mountain grades and with 10 stops. Its train regularly consisted of 11 to 15 standard weight Pullman cars, making it one of America's heaviest fast trains.

In making these 365 consecutive trips No. 56 hauled *"The Capitol Limited"* between Washington and Chicago, arriving at each terminus in turn in the morning and departing the same evening. The longest period during the entire year in which the locomotive was idle from service was 6½ hr.

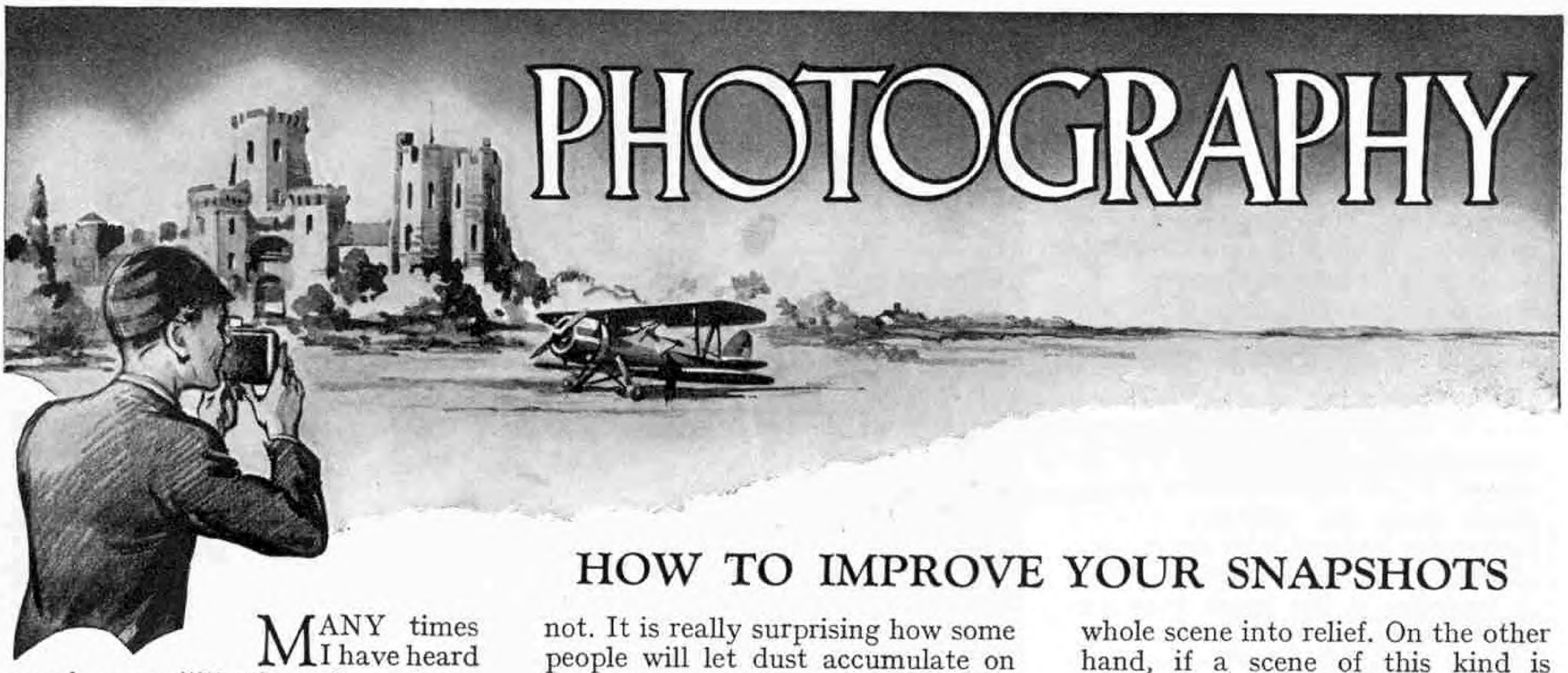


Diesel-electric locomotive No. 56 of the Baltimore and Ohio Railroad, which has set up what is thought to be a world record of continuous service. Photograph by courtesy of The Baltimore and Ohio Railroad.

L.M.S. Locomotive Notes

New engines put into service during the four-weekly period ending 23rd March were 0–6–0 freight tender engine No. 4597, of Class 4, and 0–6–0 heavy oil engines Nos. 7091-2, all built at Derby. The following engines were withdrawn in February: ex-Caledonian 4–6–0 No. 14624, Class 3; ex-Highland No. 17925, Class 4; ex-L. and Y. 0–6–0 No. 12558, Class 3; ex-L.N.W. 4–4–2T Nos. 6790 and 6824, Class 3, and 0–6–0T No. 27353, Class 2. Withdrawals in March were ex-Highland 4–4–0 No. 14381 *"Loch Ericht"* and ex-L. and Y. 0–6–0 No. 12289. Class 6 0–8–0 freight tender locomotives to the number of 16 have been reclassified class 7 after refitting.

The withdrawal of ex-L.N.W.R. tank locomotives Nos. 6790 and 6824 renders the once well-known "Precursor" tank class extinct. The engines of this class were given their name because they were regarded as the tank complement of Mr. Geo. Whale's "Precursor" 4–4–0 express locomotive, which operated the principal L.N.W.R. expresses 30 years ago.



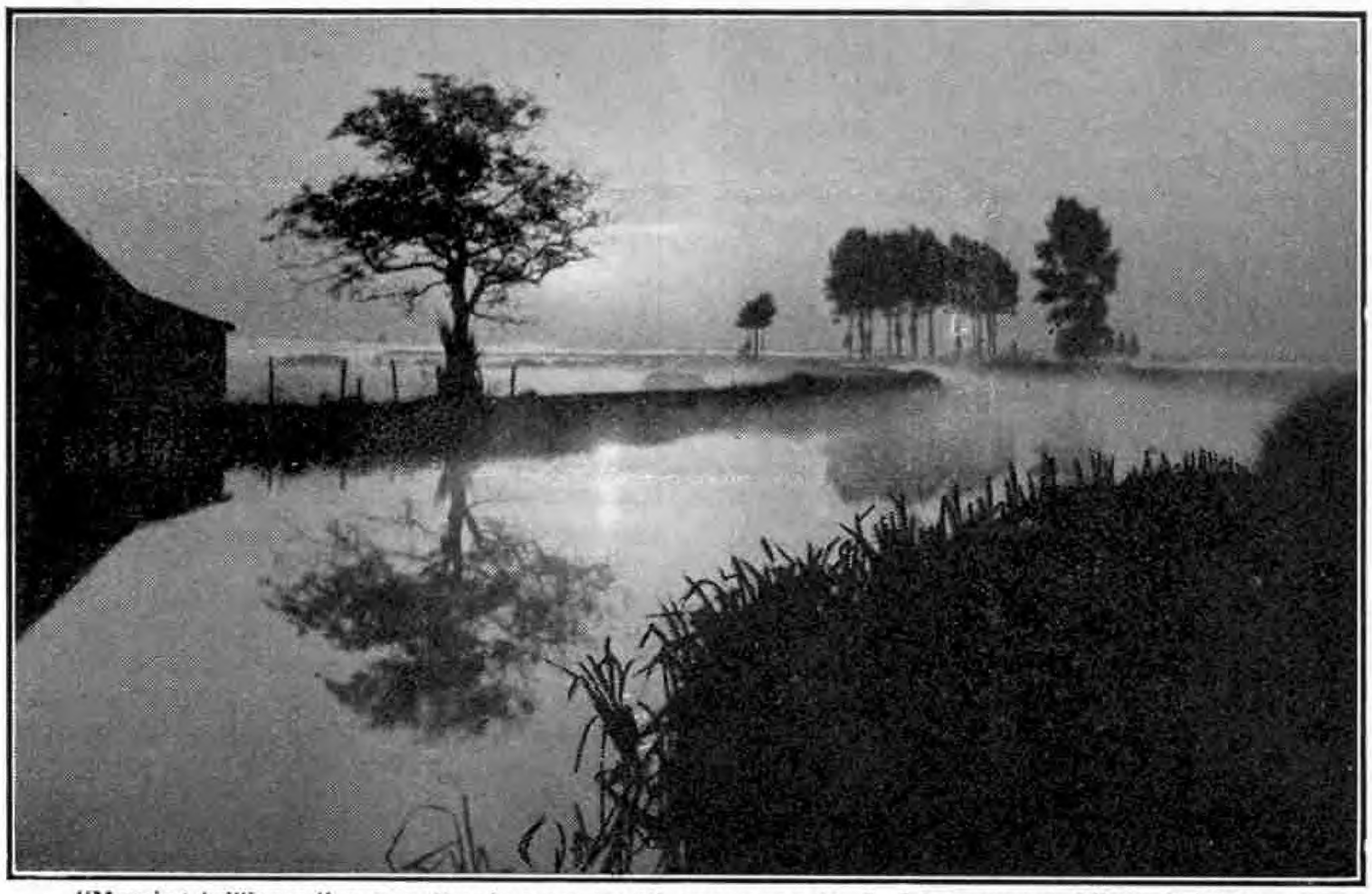
HOW TO IMPROVE YOUR SNAPSHOTS

MANY times I have heard people say: "That's a fine photograph, you must have a very expensive camera." It is, of course, quite natural to believe that the more one pays for a camera the better the pictures that will be obtained. This is not really so, however, except for certain types of photograph that are definitely beyond the scope of the cheap camera. The more costly types of camera are of marvellously perfect mechanical construction, and many of them incorporate a special type of range-finder that does away with the difficulty of judging distances. Apart from these advantages, however, the costly instrument is superior to the cheap one only in the aperture of its lens and the speed of its shutter. It all comes down to this—for all ordinary subjects where the light is fairly good, and there is no rapid movement close at hand, the cheap camera will do all that is necessary. When a picture is not satisfactory the photographer is more likely to be to blame than the camera.

In these days of high-speed films, photography is an all-the-year-round hobby, but there are still some readers who store away their cameras during the winter months. For such readers, when they are encouraged by the return of spring to renew their photographic activities, the first thing necessary to ensure good pictures is to dust the camera inside and out with a soft brush, and clean the lens with a soft silk handkerchief. As a matter of fact, these simple operations should be carried out from time to time throughout the season by every photographer, no matter whether the camera has been laid up during the winter or not. It is really surprising how some people will let dust accumulate on their lenses until it seems remarkable that any light can get through at all! The very aggravating "pinholes" that appear on films are a direct consequence of tiny particles of dust from inside the camera, and a dirty lens can produce all kinds of annoying results.

Every photograph is of course made by the light reflected from the subject, and beginners—and indeed many fairly experienced photographers—are apt to pay too little attention to the effect of the light on the subject, and therefore on the finished picture. The majority of subjects photograph best when they are lighted mainly from one side. This applies particularly to buildings, street scenes and open landscapes, because strong light across the picture gives pleasing contrasts of light and shade, and throws the whole scene into relief. On the other hand, if a scene of this kind is photographed with the sun directly behind the camera, everything seems to be flattened out, and the finished print looks dull and uninteresting. It sometimes happens that a particular scene must be photographed at a certain moment, and in such cases we have to make the best of the light. Often, however, there is no such time limit, and then it is well worth while to delay the exposure until suitable lighting conditions exist.

One of the most common causes of photographic disappointment is the attempt to make pictures of distant landscapes. A view of miles upon miles of beautiful country, as seem from a hillside, looks extremely attractive; but this is because the eye, with its marvellous optical resources, automatically adjusts itself to the long view. Unfortunately,



"Morning brilliance," a fine "against the light" photograph by F. Schorrewegen, Lièrre, Belgium.

the camera lens cannot do this. It is, of course, possible to obtain supplementary lenses that will give a longer focus, and there are lenses of the telephoto type that are specially designed for such work. The ordinary camera lens, however, is definitely incapable of making a good picture of wide-spreading landscapes, and generally speaking such views are best left alone.

Nevertheless it is possible to secure interesting results with such scenes by the use of objects or figures in the foreground. For instance, if you wish to take a photograph from the cliff-side looking across the harbour and out to sea, include the figure of a friend sitting or standing a few yards from the camera, and well to one side of the picture. A similar effect can often be obtained in the country by the use of a tree or gate in a suitable position. The whole object is to break up the foreground.



A "framed" photograph by Eric H. Coles, London, W.11.

Another useful hint for artistic photography is to arrange the scene in a frame; I do not mean a wooden frame, but one provided by overhanging trees, an arch or a doorway. Such natural frames do not occur very often, of course, but when they do advantage should be taken of them. Many quite ordinary subjects and views can be turned into very attractive pictures by means of this simple plan, and an excellent example is shown in the illustration above.

One of the first things impressed on beginners is never to take a photograph with the sun directly in front of the camera. This is good advice as far as it goes. The trouble is that the direct rays from the sun may be reflected and scattered by the lens, thus causing the peculiar and unpleasant effect known as halation. There are many occasions, however, when, provided that the lens is shielded from the direct light from the sun, very striking effects can be produced. These "against the light" pictures are well worth experimenting with.

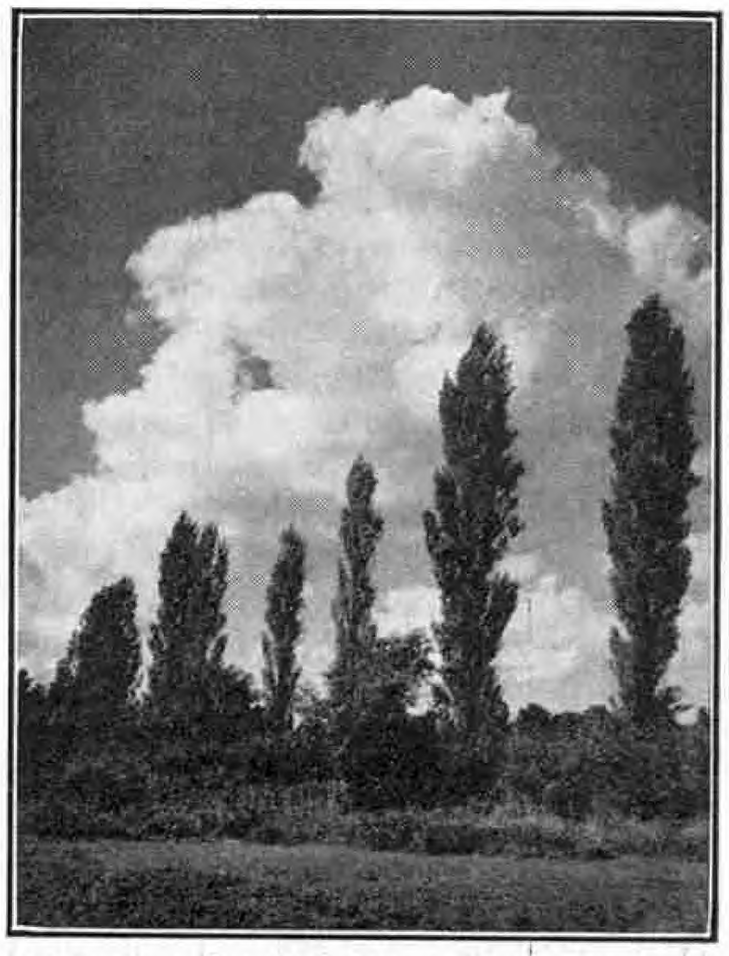
Many photographers take all their pictures from the normal level suggested by the view-finder of their cameras; that is, either at eye level or about waist level. Striking effects can be obtained with the camera much higher or much lower. For instance, wild flowers taken from eye level or waist level are dwarfed, whereas if they are taken with the camera close to the ground they look surprisingly interesting, giving the effect that one is looking up at them. Experiments of this kind are well worth trying.

Finally, I want to draw the particular attention of owners of inexpensive cameras to the importance of not attempting impossibilities. Very many cheap cameras have lenses with a widest aperture of F11, and a highest shutter speed marked 1/100th sec., but in most cases actually only about 1/25th sec. For all ordinary snapshots in fairly good light such lenses and shutters are perfectly efficient. On the other hand, they are not capable of dealing with conditions of bad light, or with close-up views of objects moving at high speed, such as trains, motor cars and rapidly-moving figures in games and athletics. The only way of dealing successfully with such subjects with a cheap camera is to take up a position well away from the subject, and secure a small but sharp image that can afterwards be enlarged.

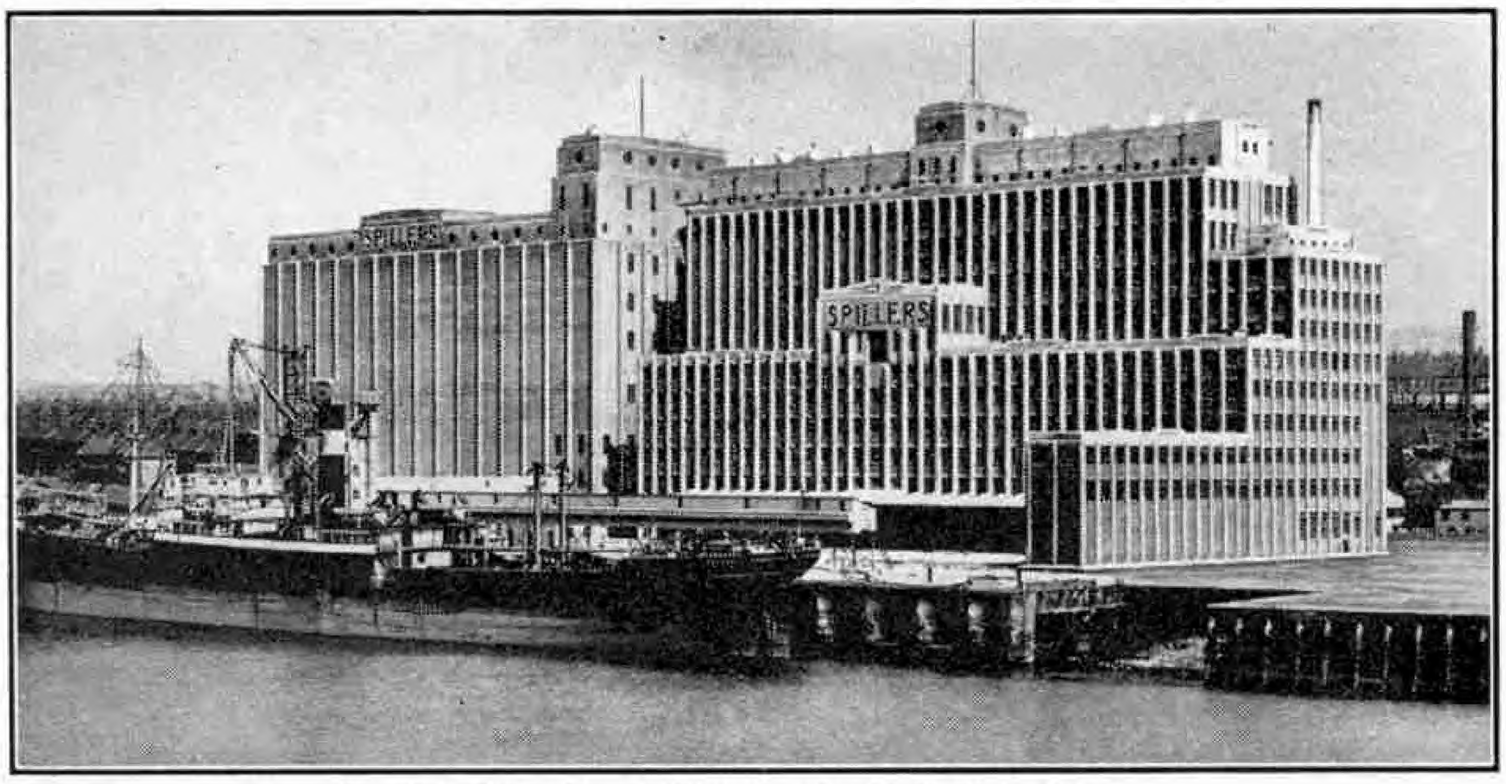


Groups of flowers are excellent subjects for low angle photography. This example is by A. G. Dell, London S.E.17.

As a result of my article in the April issue on photography during the war, I have had quite a lot of letters asking whether railway photography is permissible. It is difficult to answer this question definitely, but as many railway subjects are now on the border-line I advise readers to leave railway photography entirely alone.



"Poplars"—a beautiful tree and sky picture by J. R. Tottle, Taunton.



A modern flour mill, a striking example of industrial architecture.

Flour Milling

A Triumph of Mechanisation

By John R. G. Clover

IN the dawn of the world came the birth of the flour-milling industry. Palæothic man dropped one stone by accident upon another, and between the two lay a few grains of golden wheat. He tasted the white powder and found it good. He was the first man to discover flour.

His original idea of two stones continued unaltered throughout century after century. The rough hand querns from the tombs of ancient Egypt and the mumbling mill-stones of the water mill are just developments of that first idea. But about a hundred years ago a sudden renaissance in the technique of flour milling took place, and the principles determined then largely govern modern manufacture. This great change was the use of rolls, first made of porcelain, then of chilled steel, in the place of the crude mill-stone.

About the same time the vast wheatlands of the world began to pour out their bounty for mankind. To-day, wheats used in the English mills come from every corner of the globe. Most of this wheat is shipped in bulk, like a golden liquid lying in the darkness of the holds. It is drawn out by suction. A huge nozzle on a python-like tube is lowered into the grain, which vanishes up this pipe in a stealthy, almost uncanny way.

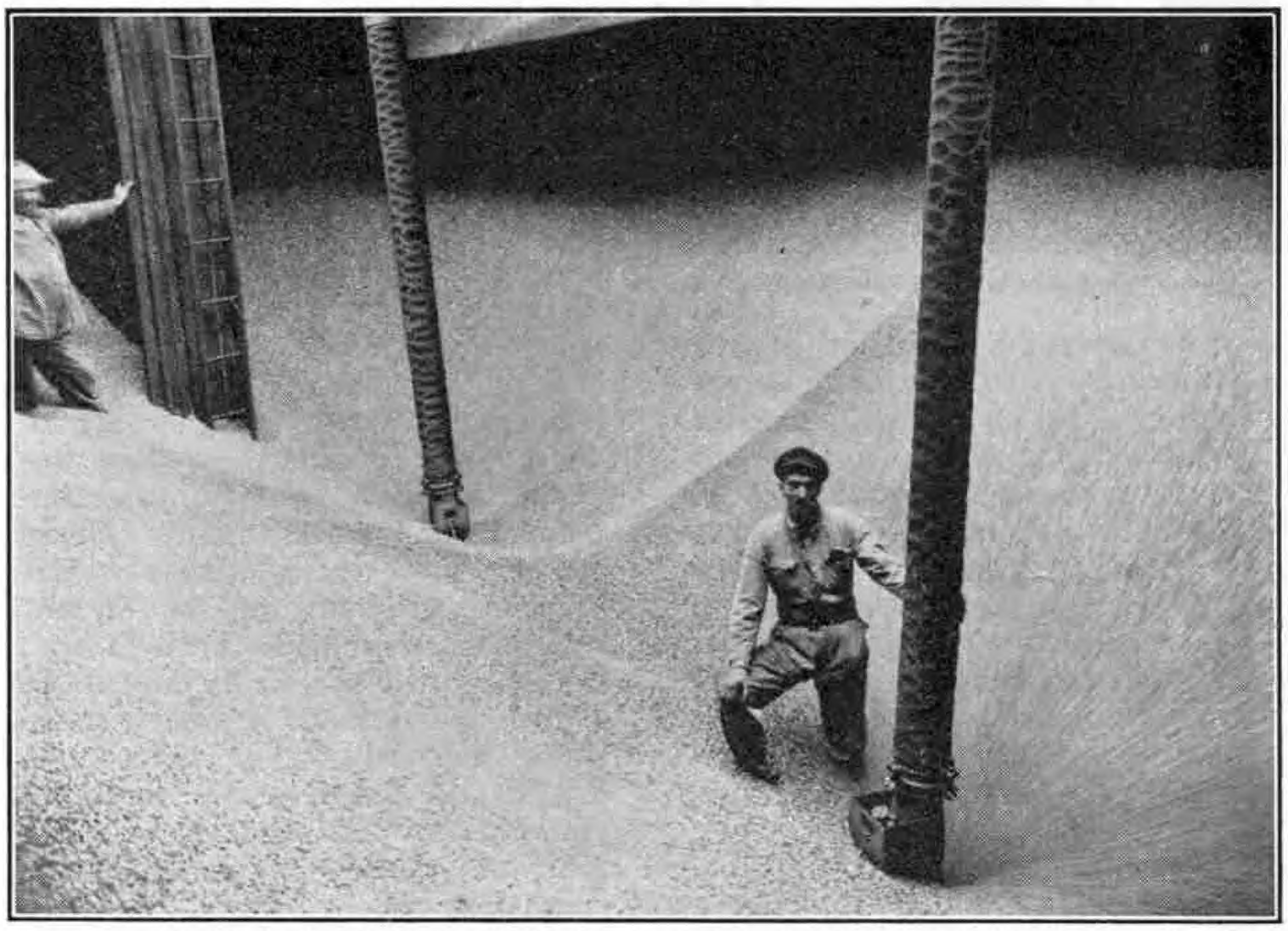
Wheat is stored in silos, which tower up from the dockside like the huge columns of some fabulous temple. Inside these silos the wheat bins run vertically from top to bottom, honeycomb fashion. From the little trap-door at the top of each bin they look like black, bottomless wells. At the bottom of these bins automatic weighers measure out the grain with robot accuracy.

During the first preliminary dry cleaning of the wheat, the larger of the impurities are taken out. Fans remove the heavy choking dust, while sieves take out sticks, stones and pieces of straw.

The barley, the oats, and a small seed commonly found in grain, called cockle, are extracted mechanically from the wheat by a machine known as a "cylinder." These cylinders, for there are many of them set up in a frame, are made of metal, indented over the interior surface. The wheat is fed in at one end and, as the cylinder slowly revolves, the grains drop into the indents, which are just the right size to receive them. As the cylinder turns it lifts the wheat out, leaving the oats and barley behind; and as the indents revolve they get to a point where they are upside down and the wheat drops out. It is prevented from falling back into the oats, etc., by a long trough, running parallel to the spindle, and thus is separated.

The cockle seeds present a different problem. They are smaller than wheat, so the indents have to be of such a size to hold cockle and yet not allow the wheat to be caught. So, as the wheat is lifted and the oats and barley are left, in the case of cockle separation it is the cockle that catches in the indents.

Before it is clean enough to grind the wheat has to be washed thoroughly to remove dirt that is invisible to the naked eye, and quickly to prevent it from becoming soggy with water. It passes through a machine that conveys it through a large tank of water and, at the same time, extracts stones that have been

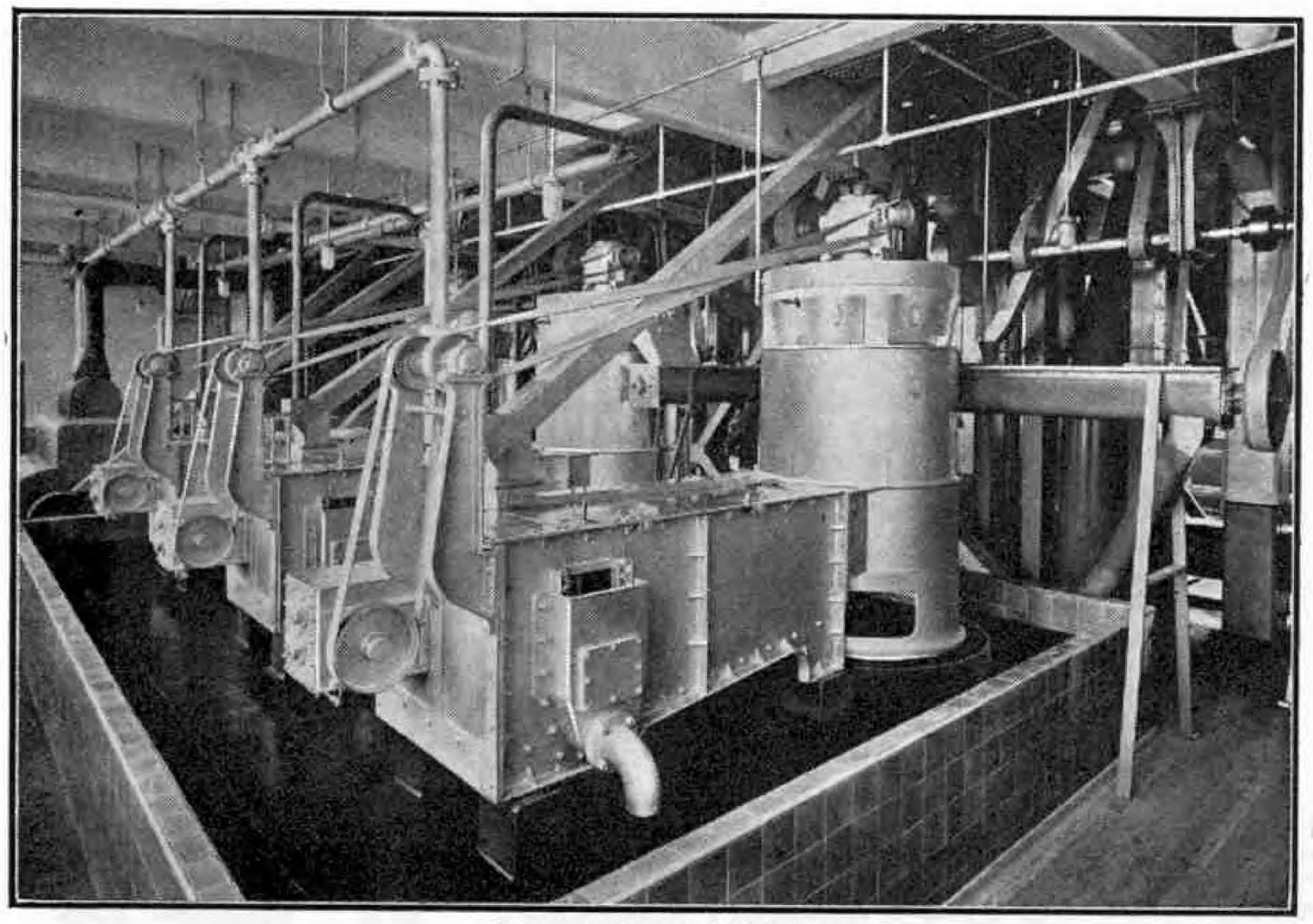


Pneumatic wheat intake. Nozzles drawing the wheat by suction out of the hold of a ship.

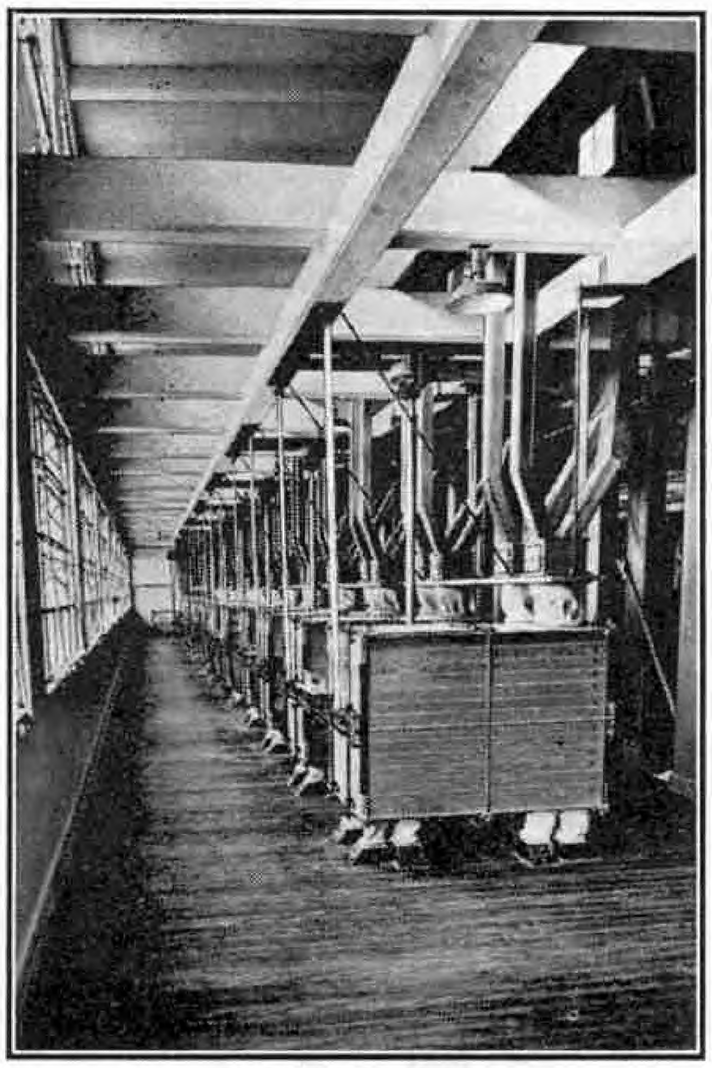
missed in the dry cleaners because they were exactly the same size as a grain of corn. The relative specific gravity of stones is greater than that of wheat, and so the separation can be made so thoroughly that a handful of wet extracted stones can be seen without a single grain in their midst.

As the grain comes away from the washers it is saturated with water. This surplus must be removed, or the wheat will become like rotten, waterlogged wood. It is led therefore into the bottom of a machine called a "whizzer." This consists of a vertical cylinder covered with a finely slotted steel skin. Inside, a spindle spins round, and attached to this are numbers of metal arms, which lift the wet wheat and at the same time whirl it round in a circular motion to the top, where it escapes. As it spins, the surplus water is thrown off by centrifugal force through the slots, and after this whizzing the wheat will be no more than just clammy to the touch.

Next comes a problem in the process that is peculiar to the English miller alone; for instead of using all the same kind of wheat, he uses grain of many different characteristics. To obtain the best results in the milling, all the wheat should be of the same degree of



Wheat washers and whizzers.



A line of plansifters.

hardness. If not, under a common grinding pressure, the softer wheats will receive too harsh, and the harder too light a treatment. So hard wheats like Manitobas, and English native corn, which is soft and yielding, must be brought to a common degree of toughness. This is carried out by a complicated machine, the "conditioner." By alternate treatments of hot and cold draughts, by contact with hot water radiators, by periods of lying in a warm, damp state, the soft wheats can be induced to part with their moisture, which is absorbed by the harder grain.

After this the conditioned corn is stored in bins, where it may lie for a day or so before being subjected to the final cleaning process before grinding. This takes the form of a brisk polish, and the removal of what is known as "crease dirt."

Every grain of wheat has a tiny fold running up its length, and this may harbour dirt that the cleaners might have missed. This is removed by the "brush machine," which consists of many brushes whining round inside a metal casing, rubbing the wheat round and round and thrusting their bristles into the narrow crease. When the wheat comes out it shines like polished mahogany.

And now, only now, is the wheat fit for milling into flour.

To understand the principle of the modern process of flour milling, one must realise that the grain is not merely pulverised into a powder. It is far more complicated than that. The outer skin has to be cut open, and the kernel neatly scraped from the inside. Then, in its turn, this kernel has to be reduced to flour.

When the berry is opened, the inside does not drop out conveniently like a cracked nut. It clings tenaciously to the bran, which is the name given to the outer skin, in fact it is difficult to know where one ends and the other begins. So the miller has to deal with stocks consisting of bran as well as flour particles, all mixed together. For these reasons the mill does not consist of just a few independent machines. It is a connected collection, occupying most of the floor space on many storeys.

Now as the kernel is scraped out of the berry, the particles are of various sizes. The smallest, of course, are flour, and then as they get larger they are called by different names, for example "dunst," "middlings," and "semolina." So roughly speaking the machines fall into several ranges. Some open the grain, some sort and grade the different sizes of semolina, etc., some purify the graded semolina, some grind it to powder, and some sift the flour from this pulverised product. In addition there are fans for dust and humidity collection, elevators for lifting stock from one floor to another, worm conveyors that transport products in a horizontal plane, and spouts innumerable, through which stock can flow from one machine to another. From golden grain to silver flour, the whole process is mechanised. In course of milling nothing is touched or handled by men.

The preliminary opening of the grain, to allow the extraction of the interior, is performed on chilled steel rollers. These are carried in a massive box-like frame of cast iron, fitted with inspection doors to allow the

attendant to examine their running. Generally there are two pairs of rolls in each frame, each pair independent of each other. The product to be opened, or "broken," is fed in a thin even stream between the two rolls, which are fluted with sharp corrugations, cut at a slight angle to the axis. At each end of the roll, vernier adjustments allow the rolls to be brought nearer together. One complete turn of the large gleaming hand wheels alters the tiny gap between the revolving rolls by about one-hundredth of an inch. And in practice the skilled rollerman can move the wheel less than a quarter of a turn, and then tell, either by the look of the stock or by the feel of it between his fingers, whether the adjustment has been correct.

As the wheat is opened, considerable heat and moisture is released. Each pair of rolls is fitted with an exhaust. From one huge fan a current of air is being continually drawn away from the rolls, cooling them and carrying away moisture. As a roll may be under pressure from Monday morning, day and night, until Saturday, without stopping, it can be understood that the heat would be terrific if it were not for the exhaust. But for this the rolls would be steaming hot, and water would drip from projecting points.

The reason for fluting these rolls is to cut, rather than crush. In fact this cutting action is exaggerated in another ingenious way. One roll runs slower than the other and thus tends to hold the wheat or product in the flutes, while the faster roll cuts across it.

After the wheat is first opened on the first break roll, it drops down into an elevator that carries the stock right up to the top of the mill. This elevator is just an endless belt, running in wooden legs, and carrying numbers of small buckets. Once the miller gets his stock to the top of the mill, he can run it like water through spouts, and thus through various machines, until it reaches the roller floor, where it will be ready for further treatment by these machines. Thus height is important, and that is why a mill is always a tall, rather gaunt-looking building from the outside, while inside all the square wooden spouts run in all directions like a crazy forest.

To the layman, the spout runs may look like nightmare confusion, but the operative must know exactly what they carry, where they go, and from what machine they come. And there may be a hundred or more under his charge.

However, when the product from the first break rolls reaches the top of the mill, it falls into a machine that sifts out first the largest pieces of outer skin, which will need further scraping, and second, particles of kernel ranging from dust to granulated sugar in size. The former drop down to the rolls for further treatment, while the latter goes on to machines that grade it according to size, and at the same time purify it.

Four sets of break rolls attend to this work of releasing the kernel, and the machines that sort the result of their work are called "plansifters." These consist of large sieves, clamped tight to one another, thus looking like a huge box from the outside. The sieves are covered with wire and silk of varying meshes stretched over the sieve frame as tight as the parchment on a drum. Each machine has two of these boxes of about a dozen sieves, and they jerk round in a very constricted circle that gives the essential movement to dress the stock through the tiny meshes of the silk.

All these plansifters stand in a long swaying line and, swinging round and round, they look rather like a chorus of plump mechanical ladies. Actually it is rather an unskilful chorus, for although they all swing just the same amount, they all do not do it at the same time. For exactly as a battalion breaks step over a bridge, so the plansifters run out of time to avoid the enormous strain that otherwise would threaten the structure of the mill.

The stock that is released by the break rolls and graded by the plansifters runs down on the purifiers. Here it is cleaned and sorted into various sizes. Each size is suitable for a pair of rolls that will pulverise most of it into flour. The purifier is a long silk-covered sieve that shakes to and fro so fast that one can hardly see it. The stock to be purified is run over the silk in a fine silver stream, and according to the size of the silk mesh through which it falls, so it is spouted away. Through this fine stream, a powerful blast of air is drawn; and thus the pure solid stock remains on the sieve, but the light feathery impurities are swept away like the chaff in a threshing barn.

The pure stock is a little like granulated sugar in appearance, but it is now merely large pieces of flour. That is to say, it has only to be ground into smaller pieces to become familiar flour as everybody knows it. This grinding is carried out by more rolls, exactly like the break rolls to look at from the outside. But there is one difference; the rolls are smooth instead of fluted, for now they have to grind, not cut.

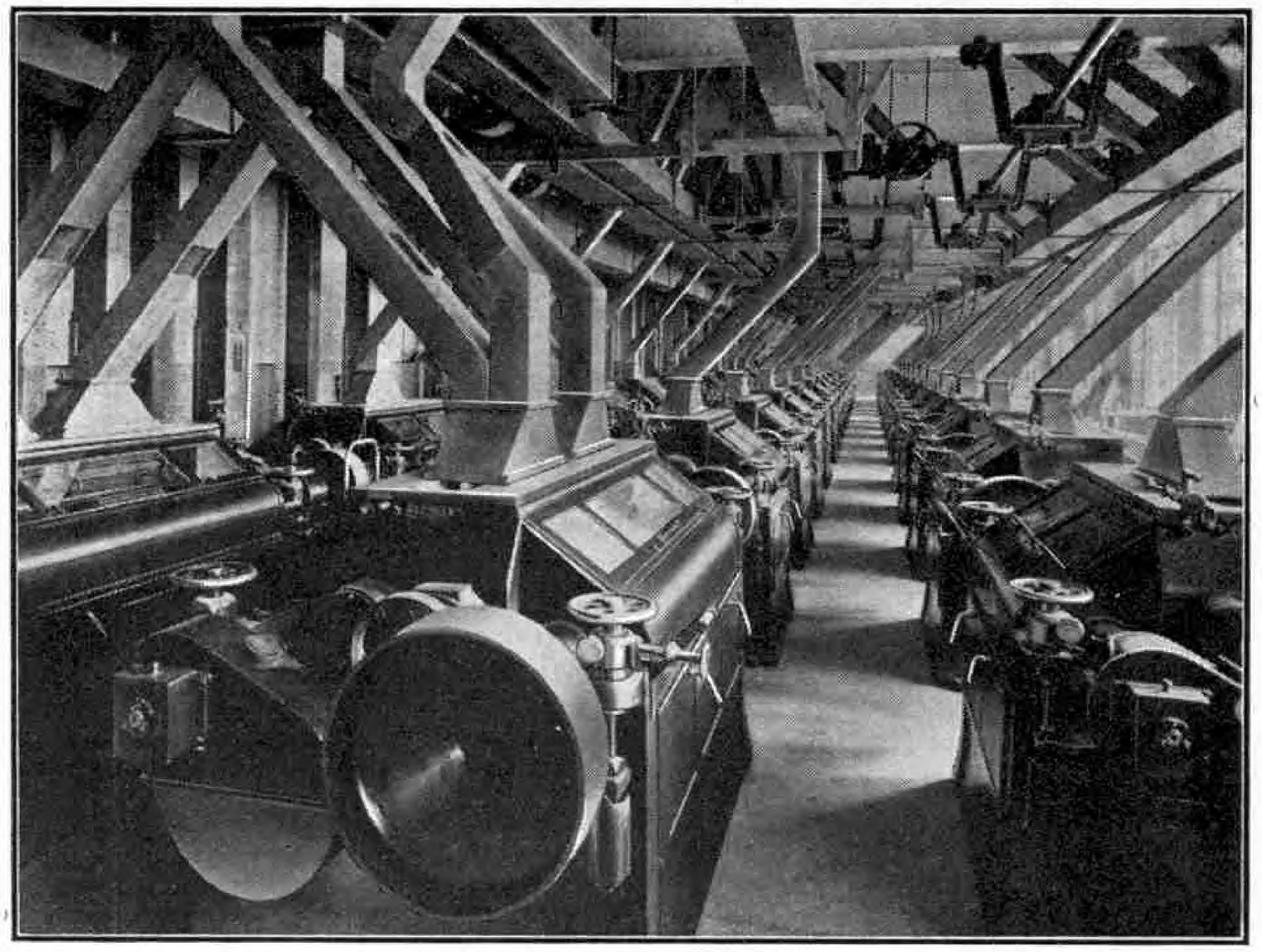
So once again the stock has got back to the roller floor, the noisiest place in the mill, with the roar of grinding, the clatter of gears innumerable, the clack as the belts run over the pulleys, and somewhere, as always in a mill, the sad moaning of a fan. Each of the grinding rolls, or "reductions" as the miller calls them, does not completely crush the stock. After it drops away from the rolls, the stock falls to an elevator and up to the top of the mill it goes, for now the actual flour has to be separated from the unground particles.

This can be done by more plansifters with silks of a finer mesh, or by machines called "centrifugals." As the name suggests, here the flour is dressed through the silk meshes by centrifugal and not oscillatory motion. The stock is fed into a circular drum round which the silk is stretched. Inside, beaters revolving at a faster speed than the drum hurl the stock against the silk and through the meshes. The coarser stuff, which is too big to get through the silk, comes out at the remote end of the drum and is ground again.

After the flour is sifted through the gossamer silk of centrifugal or plansifter it is carried out of the mill by automatic conveyors into the warehouse. Here it is "packed," weighed up into bags of 140 lb., tied and labelled. Two of these bags go to a "sack," the unit by which flour is sold.

In the warehouse the flour is stacked in long rows of perfect precision until it is tipped down the spiral sack chutes to the loading doors, where it clicks over an automatic counter on to the lorry. From the time it is milled it may be a fortnight before the flour goes out, and it may lie another fortnight in the bakers' loft before it goes into the dough machine. But flour, like wine, improves with age, and the milling and baking industries have adjusted themselves so that flour is baked at its optimum quality.

Generally speaking there are two grades of white flour, that which is used for pastry, and that which is used for commercial bread making. The former is taken from certain machines in the mill, and roughly represents the flour extracted from the centre of the berry. The latter, so keenly has the art of milling developed, is that which is found nearer the outer skin of the grain, in fact in some cases it has actually been scraped from the inside of the skin itself.



A roller floor in a modern flour mill.

EDITOR'S NOTE:

The foregoing article was written before the outbreak of war, and the flour position is no longer as indicated in the final paragraph. All the flour from the flour-producing machines is now run together to make a single grade of flour, and departure from this practice is only allowed on Government licence.

A Giant American Air Liner

Twin-Engined Sub-Stratosphere Machine

By H. J. Shepstone, F.R.G.S.

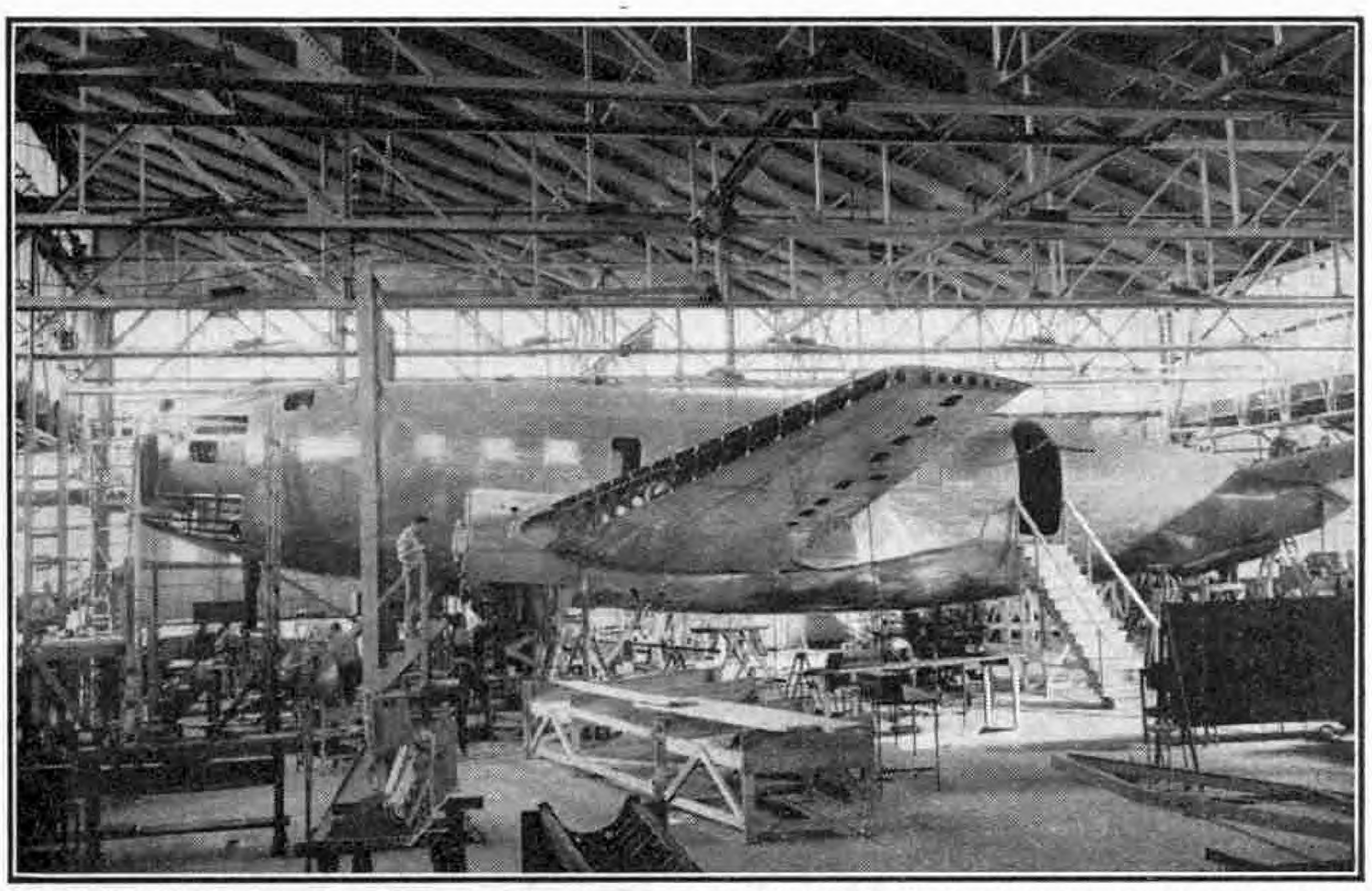
THE largest twin-engined high-speed transport aeroplane ever constructed in the United States was flight-tested recently at St. Louis, Missouri. It is the newly designed low mid-wing, all-metal Curtiss-Wright sub-stratosphere machine, built as a club type to transport 30 passengers, a crew of from three to five, and 6,000 lb. of mail and express at approximately 3½ miles per minute at altitudes up to 20,000 ft. As a sleeper version it will accommodate 36 passengers by day and 20 in berths at night.

The aircraft has been designed by factory engineers working in close consultation with U.S. airline experts to develop a larger and faster air liner. It is 75 ft. from nose to tail, has a wing span of 108 ft., is 19 ft. 2 in. high, weighs 24,750 lb. empty, carries a useful load of 13,250 lb., and weighs 38,000 lb. fully loaded. It is equipped with two fuel tanks in each of its two wings, the four having a total capacity of 1,000 gallons.

The new air liner has two 14-cylinder Wright Double-Row "Cyclone" engines that are calculated to give it a maximum speed of 243 m.p.h. at 13,000 ft., a cruising speed of 210 m.p.h. at 10,000 ft., a climbing speed of 1,440 ft. per minute, and a landing speed of 70 m.p.h. Curtiss-Wright engineers have designed the new type so that it can be equipped with power plants of considerably greater power than those now installed.

The power plants are equipped with 15 ft. electric "full-feathering" propellers, which are the largest ever manufactured for air line operations in the United States. The "full-feathering" type, a design that Curtiss-Wright was the first to develop and manufacture, not only enhances single engine performance, but also eliminates destructive engine vibration likely to occur in case of engine failure when using a propeller that permits "windmilling."

To permit normal cruising at 20,000 ft. with equivalent "cabin altitude" of 6,000 ft., pressurisation of the fuselage is obtained through a new cross-sectional design of two eccentric circles, intersecting in such a way that the floor joins their points of intersection. The floor thus acts as a tension tie to withstand loads caused by the tendency of the two circles to separate under pressure. Above the floor is a roomy, luxurious passenger cabin—6.9 ft. high by 9.75 ft. wide (at window height) by 35.3 ft. long—with fixed-reclining or swivelling-reclining chairs for as many as 40, or sleeping berths for 20; and below is a spacious cargo hold of 550 cu. ft. capable of accommodating 5,200 lb. of cargo, and there is also a separate compartment of 137 cu. ft. to contain such accessories as batteries, water tanks, etc.



The Curtiss-Wright Sub-stratosphere monoplane under construction in the St. Louis factory of the Curtiss-Wright Corporation. It is designed to carry 30 passengers and 6,000 lb. of mail and freight, and is the largest twin-engined air liner ever produced in the United States of America.

The wing design was developed following tests that proved that lateral control can be retained at and below the aeroplane's stalling speed by modifying the airfoil towards the wing tip. Thus the plane may execute three-point landings at minimum speed without chancing "falling off on one wing." Special Curtiss-Wright slotted flaps attached to the trailing edge of the wings, inboard of the ailerons, move directly aft during the first part of their motion to provide added lift for take-off and initial climb, and revolve downward for the latter part of their motion to accomplish air-braking.

The landing gear was so designed as to eliminate the possibility of failure. In anticipation of the further development of blind flying technique, the gear was designed to permit landing at a rate of descent of 800 ft. per minute, the landing being cushioned by an extremely long shock absorber travel. The geometry of the structure has been so worked out that when the machine is on the ground there is no possibility of the landing gear folding even if the power is applied. As long as the weight of the machine is on it, the landing gear cannot be retracted.

While the use of only two engines relieves the pilot of the extra responsibility and effort attendant on the presence of a multiplicity of power plants, Curtiss-Wright engineers have further simplified the pilot's operation of the new skyliner by reducing the number of flight controls in the modern transport 33 per cent. They have perfected a "tell-tale" safety device that automatically checks the operation of some 50 instruments and controls.



The Avro "Anson" in Action

Our striking cover this month shows an Avro "Anson" chasing a German raider, and is reproduced from an illustration kindly supplied by A. V. Roe and Co. Ltd. The "Anson" twin-engined monoplane is designed for coastal reconnaissance and light bombing, and machines of this type used by the R.A.F. are playing an important part in keeping a lookout for enemy aircraft and warding them off, and in patrolling our coasts in search of hostile warships and submarines. The "Anson" has been adopted also by the Air Forces of Australia, Greece, Egypt and Eire.

Scale Model Flying Boat with 50ft. Wing Span

When a new type of aircraft has been designed it is usual for scale models of it to be constructed for test work in a wind tunnel and, in the case of a flying boat, in a water tank. Saunders-Roe Ltd., of Cowes, the well-known builders of flying boats, have gone an important step further. The experimental work involved in their plans to build a giant type of flying boat for commercial use has included the construction of a flying scale model, in addition to the one used for tank and wind tunnel tests. This miniature high wing monoplane flying boat is illustrated on this page. It is 42 ft. 8¾ in. long, with a wing span of 50 ft., and its height at the tail, when the boat is in flying position, is 12 ft. 8¾ in. It can carry one passenger in addition to the pilot.

The size of this scale model was determined by the smallest powered engine available, the 90 h.p. Pobjoy "Niagara." The boat has four "Niagaras" built into the leading edges of the wings, and each drives a two-bladed wooden airscrew. The hull is of metal, but to make modifications easier the wings are of wood, with plywood coverings. The wing-tip floats are short and deep, and on the model are of rigid construction; but on the full-scale machine they would retract into the wings.

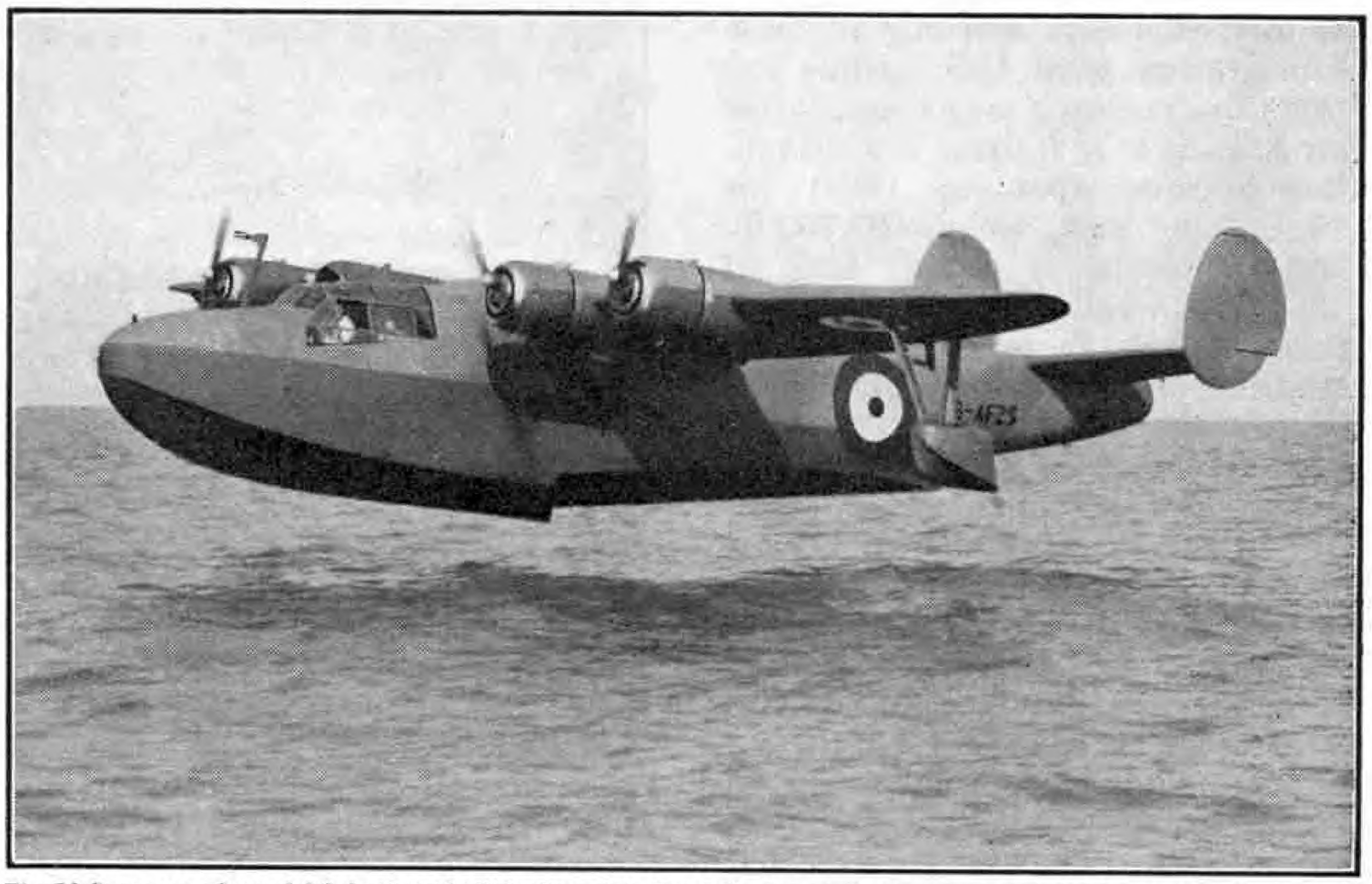
The information that is being obtained from this flying model is proving to be far more valuable than that secured solely from tank and wind tunnel tests. It is not possible at this early stage to give details of the flying boat to be developed from the model, but it will be larger than any at present in operation, and will have a much improved performance, longer range, and a considerably greater load-carrying capacity.

* * * *

The steady growth of air mail traffic in Canada is shown by figures published recently. In 1938–9 mail carried by air totalled 1,822,399 lb., as compared with 1,367,972 lb. in 1937-8. The distances flown were 3,711,987 miles and 1,474,041 miles respectively.

World's Largest Wind Tunnel for Japan

The 50-acre plant under construction at Mitaka-mura, Tokio, for the Central Aeronautical Institute of Japan, is to include a giant wind tunnel which, it is claimed, will be the largest in the world. It will have a working section almost 50 ft. in diameter, and will be large enough to allow full-size aircraft to be tested in it in conditions equivalent to flying at about 600 m.p.h. Other features of this great plant will be a series of small wind tunnels, laboratories, an aircraft factory and aerodrome, and a training school. The whole project is expected to take about five years to complete.



The 50 ft.-span scale model flying boat built by Saunders-Roe Ltd., Cowes, to whom we are indebted for this photograph. The boat can carry a passenger in addition to the pilot.

Photographic Monoplanes for United States Army Air Corps

The first of a fleet of aircraft specially designed for air photography duties has been delivered to the Wright Field air station of the United States Army Air Corps. It is known as the F-2, and has been built by the Beech Aircraft Corporation, who claim that it is the first aeroplane specially designed to carry two mapping cameras in tandem. Various types of aerial cameras, such as the oblique spotting and rapid reconnaissance mapping types, can be fitted.

The F-2 is an all-metal low wing monoplane with seating for a crew of three, and fitted with two Pratt and Whitney engines driving two-bladed airscrews.

Homing Pigeons Used by R.A.F.

Half a million homing pigeons are being used by the Royal Air Force. Of this number 2,000 birds are on duty daily with the Coastal Command, ready to carry messages from reconnaissance aircraft to their bases when circumstances demand that the radio shall remain silent.

The pigeons often show remarkable tenacity in fighting their way home. One bird, released from an aircraft at 13,000 ft. in clear weather above a blizzard off the Scandinavian Coast, found the altitude uncomfortable and dropped like a plummet to 1,500 ft., at which height it is accustomed to fly. When the bird disappeared into the blizzard below, the pilot of the aircraft gave it up for lost; but three days later it arrived back at its base. It had fought its way across the North Sea in blinding snow and a roaring north-westerly gale.

Recently another pigeon, wounded in the head and wing, struggled back to its loft at an R.A.F. station, but died soon after reaching home. Unfortunately this was only one of several similar casualties among Service pigeons. During the wood-pigeon shooting season as many as 100 homing pigeons are destroyed every week by inexperienced sportsmen. No pigeon-shot of experience would mistake one of these birds for the wild variety, as the flight of a homing pigeon is straight and fast while that of a wood pigeon is slow and erratic. The destruction of a homing pigeon may result in the death of the crew of some reconnaissance aircraft forced down in the sea while policing the ocean trade routes against marauding U-boats, and the murderous attacks of enemy aircraft.

* * * *

British Overseas Airways Corporation, formed by the merger of Imperial Airways Ltd. and British Airways Ltd., officially came into being on 1st April last. The corporation will be generally known as "Airways."

* * * *

The application by Pan American Airways for a license to operate an air service across the Pacific Ocean between San Francisco and New Zealand has been granted. The route will be by way of Los Angeles and Hawaii.

New R.A.F. Appointments

Air Chief Marshal Sir Edgar Ludlow-Hewitt has been appointed Inspector General of the Royal Air Force in succession to Sir Edward Ellington, who is retiring at his own request. Sir Edward was due to retire in September last year after 43 years' Army and Air service, but he continued in office during the first six months of the war. By this appointment Sir Edgar vacates the post of Air Officer Commanding-in-Chief, Bomber Command, in which capacity he planned the successful R.A.F. raids on Kiel, Sylt, and Wilhemshaven, and many reconnaissance flights across Germany, Czecho-Slovakia, Austria, and Poland.

The new head of the Bomber Command is Air Marshal C. F. A. Portal, who is 47 years of age, and the youngest Commander of an operational command of the R.A.F. at Home. Air Marshal Portal has risen from the ranks. He joined the Royal Engineers as a dispatch rider in August 1914, two days after Britain entered the war of 1914–18, and gained a commission two months later. He served in France for 2½ yrs., first as a Sapper officer, then as Observer officer with the R.F.C., and later as a pilot. His war services gained him the M.C., D.S.O. and bar, and three mentions in dispatches. After the war he commanded one of the crack Bomber squadrons of the R.A.F.

Flares Over Berlin

Parachute flares have been dropped over Berlin during R.A.F. reconnaissance flights. These flares are carried in the bomb-rack of the aircraft and are released in much the same manner as a bomb. The nose of the tubular case containing the flare with small parachute attached is fitted with a vane that causes a slight explosion when the case has fallen a certain number of feet. The explosion ignites the flare and blows it and the parachute out of the case. The parachute then opens and supports the flare, the heated air that rises from the burning magnesium giving extra buoyancy. The flare falls very slowly, and often remains poised for some time. Parachute flares are mostly about 8 in. long and burn for nearly 10 min. They shed a brilliant light, as much as 2,000 c.p. or more, according to size.

In addition to advertising the presence of R.A.F. aircraft over Berlin, the flares are useful for observation purposes.



A Fokker D 23 single-seater Fighter. It has two 540 h.p. Walter "Sagitta" engines, mounted one at each end of the short fuselage, and can attain a top speed of about 385 m.p.h. Photograph by J. I. Dorgelo, Jr., Holland.

The First Aerial Newspaper

A daily newspaper, which is believed to be the first ever produced in the air, is the latest achievement of Qantas Empire Airways Ltd., the company operating the Sydney–Singapore section of the England–Australia Empire air service. News is picked up by radio during flight, typed on sheets of paper, and distributed to the passengers. Advertisements also are printed in this aerial newspaper.

Great New Airport for Washington

A fine new airport is almost completed near Washington, the capital of the United States, and it has been named Washington National Airport. The new airport is 3½ miles from the city, on the west bank of the Potomac River. Its total area is 750 acres, and the several runways range from 4,200 ft. to 6,875 ft. in length.

* * * *

A replacement Empire flying boat completed recently has been named "*Cathay*."

Australian Flyers Guard Convoys

Since the Royal Australian Air Force Squadron serving in Britain with the R.A.F. Coastal Command made their first operational flight early this year they have completed 25,000 miles' flying on convoy escort. About 250 ships have been escorted in and out of the waters around our coasts. The Squadron is equipped with Short "Sunderlands," the 20-ton, four-engined, long-range flying boats developed for the R.A.F. These boats are powerfully armed. They have a top speed of about 210 m.p.h., and can carry their crew of seven a distance of 2,500 miles.

When the pilots and crews of this Squadron arrived in Britain last Christmas few of them had flown in "Sunderlands." Some officers who had come to this country earlier formed a nucleus to instruct the newcomers, and since then the Squadron has been training and making operational flights at the same time. They now have trained crews for all their flying boats.

The Squadron's longest flight was made in late March, when one "Sunderland" flew for 12 hrs. on continuous escort duty, covering nearly 1,600 miles.



The Lockheed XP-38 single-seater interceptor fighter, a new type in production for the United States Army Air Corps. It is a twin-fuselage, all-metal monoplane, with two 1,000 h.p. Allison engines and a tricycle type retractable undercarriage. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.

ENGINEERING NEWS

Liverpool's Cathedral Bells

A peal of 13 bells weighing nearly 16½ tons for Liverpool Cathedral has now been completed in London. The bells range in diameter at the rim from just under 3 ft. to 6 ft. 4 in. They form the largest peal ever made. The bells are said to be flawless, but their music will not be heard until after the war, for they are to be stored for safety until happier days return.

In addition to the peal of 13 bells there will be a Great Bourdon Bell, which will tell the hours over Liverpool. This will not be cast until the war is over.

A Large Neon Clock

A giant rotating neon sign in the form of a clock, which is claimed to be the largest in Europe, has been erected on a tall steel tower in the centre of Stockholm, Sweden. The tower is erected over a building that was originally the principal telephone exchange, and wires from it passed overhead to all parts of the city. Nowadays all the city's telephone wires are carried in underground conduits, however, and the overhead system has not been used for some years.

The clock sign contains a total of 345 ft. of neon tubing. On one side it displays the letters N.K. in green tubing, and on the other side the dial and hands of the clock, which are outlined in red tubes. The dial has a diameter of 23 ft. and consists of a welded iron ring stayed by cross members. The mast on which the sign is carried consists of a 115 ft. seamless tube, inside which is a shaft that rotates the sign at a rate of 4 r.p.m. The hands are moved one minute at a time by electric impulses transmitted by an electrically-driven master clock. This movement is operated from a third shaft that runs inside the main shaft and connects with enclosed gearing that transmits the movement to the hands. The minute hand is 15 ft. long and weighs nearly 100 lb.

Life-boats Have No Guns

A photograph of one of the Cromer life-boats being launched was published in a weekly illustrated paper last week and in the caption it was stated that the boat was "armed with a machine gun." The Royal National Life-boat Institution wishes it to be as widely known as possible that this statement is incorrect. Life-boats carry guns for throwing a line to a wreck. These cannot be used for any missile, or adapted for such use, however, and no life-boats are armed.

The sole purpose of the Institution's life-boats, in war as in peace, is to go to the help of those in peril at sea round our coasts, whatever their nationality. In carrying out this duty since the war began they have been launched on a number of occasions to the help of German aircraft which had been brought down. They have been launched also nearly 200 times to the help of vessels in distress belonging to other foreign countries, and have rescued over 500 lives from them.

Their sole duty of life-saving entitles them to immunity from attack, and the incorrect statement that they were armed might be used to refuse them that immunity.

Award of First Life-boat "V.C." of the War

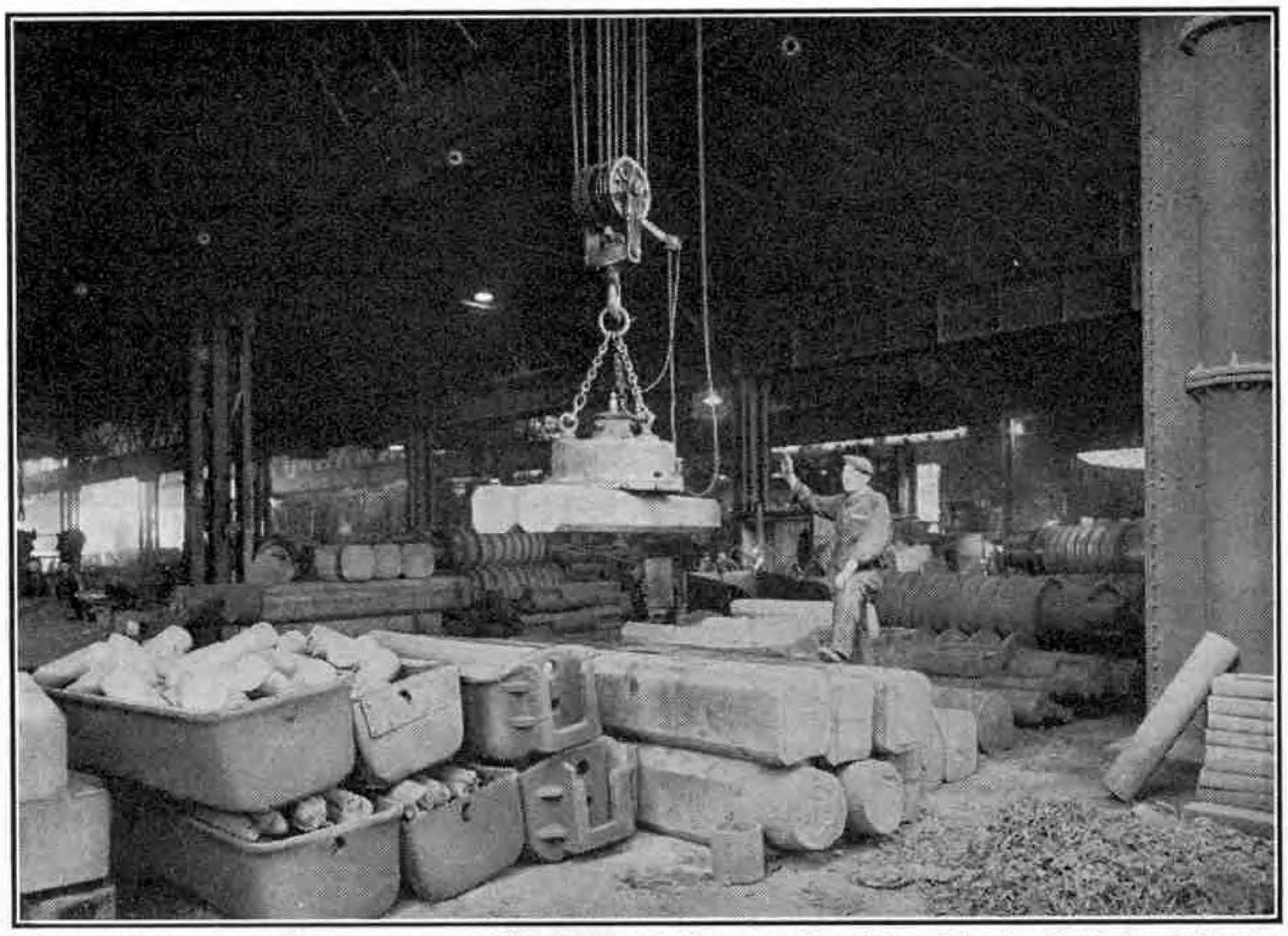
The Royal National Life-boat Institution has awarded its first Gold Medal of the war. This medal, which is given only for conspicuous gallantry, is the Victoria Cross of the life-boat service, and has been won by Coxswain Robert Cross, of the Humber, for the rescue on the night of 12th February last of the crew of nine men of the trawler "*St. Gurth*" of Grimsby. The Institution has also awarded its Silver Medal to each of the five members of the life-boat crew.

The trawler had gone ashore in a gale and the seas were breaking right over her. It was pitch dark and snowing heavily. The life-boat's crew was two short owing to illness. The life-boat itself was damaged during the rescue, one of her propellers being fouled by a rope and put out of action. The men on the deck were continually knocked down by the heavy seas, and the motor mechanic, standing at his engine controls in the cockpit, was just able to keep his chin above water. In face of these very difficult conditions, however, the entire crew of the trawler was rescued.

The Humber life-boat has saved 189 lives since the outbreak of war, and in these seven months Coxswain Cross has won the Institution's Gold Medal, its Silver Medal, its thanks on vellum and a special letter of thanks. He has won the Silver Medal three times and also possesses the Bronze Medal.

The Institution has received a gift of £50 from the owners of the Dutch steamer "*Laertes*," which struck a mine and caught fire. The Hastings and Eastbourne life-boats both went to her help, but she was able to reach Holland under her own power. The gift was sent with "sincere thanks to all those who are ever ready to take risks to help their fellow seamen when in danger."

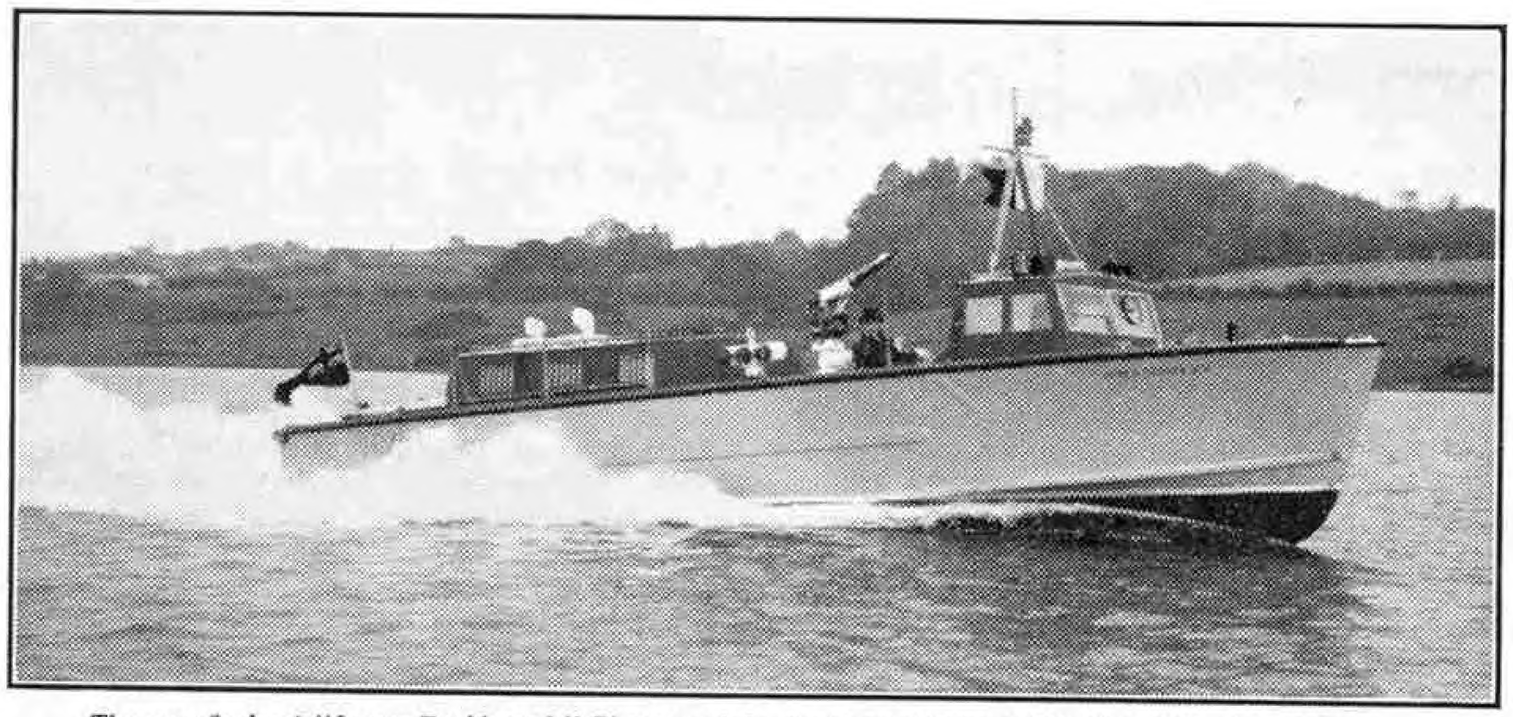
Two new motor life-boats, one for Margate and the other for Portrush, Northern Ireland, have recently been laid down. Both will be powerful 46 ft. cabin life-boats with two 40 h.p. Diesel engines and a speed of over 8 knots. They will be able to travel 200 miles at full speed without refuelling, and will be fitted with line-throwing gun, electric searchlight and wireless. The Margate boat is a gift from the Civil Service Life-boat Fund.



A 36-in. "Witton-Kramer" electro-magnet lifting two steel blooms, each weighing 25 cwt., at a large steelworks in England. Photograph by courtesy of the General Electric Co. Ltd.

Gears Made from Iron Powder

Gears in some American cars are now being made from iron powder, which is pressed into moulds and then subjected to a special heat treatment. It is said that gears made in this manner are very accurate and that the teeth do not require machining before use. They are being used in certain types of oil pumps employed in many internal combustion engines.



The new fireboat "James Braidwood." Photograph by courtesy of Samuel White and Co. Ltd., London.

A Fast Thames Fireboat

The upper illustration on this page shows the "*James Braidwood*," a fireboat that has been designed and built by J. Samuel White and Co. Ltd., London, for the London County Council Fire Brigade. The vessel has a length of 45 ft. and is very fast, her designed speed being 20 knots.

The wheelhouse is placed well forward, and behind it is an open cockpit fitted with fore and aft seats, from which a door gives access to a storage compartment for the necessary gear and equipment. Aft of this store is the engine room, which contains both the pumping and propelling machinery, and still further aft is a large cockpit. The deck over the storage compartment and the forward end of the engine room provides a platform for fire-fighting operations, and is covered with non-slip rubber to give a good foothold.

The boat is propelled by three 110 h.p. six-cylinder petrol engines, directly coupled to the propeller shafts. Fuel for the engines is stored in a tank fitted in the stern. The wing engines are utilised also for driving the turbine fire pumps, each of which has a capacity of 750 gall. per min. at a pressure of 100 lb. per sq. in. The two pumps deliver into a common pipe system that conveys the water to a 5 in. bore monitor and to swivelling deck boxes, to which hoses can be connected as required.

As the boat may sometimes have to be used on canals crossed by bridges, the height of the superstructure had to be limited so that fixed objects are more than 7 ft. 6 in. above the water-line. The bipod mast is hinged and can be quickly lowered when necessary.

The construction of the "*James Braidwood*" has been carried out under the supervision of Mr. F. Dewhurst, A.M.I.Mech.E., A.M.I.A.E., the Mechanical Engineer of the London Fire Brigade, and to the survey of Lloyds Register of Shipping.

A Motor Road in Abyssinia

Italian engineers have completed the construction of a motor road between Addis Ababa, the capital of Abyssinia, and the port of Assab, on the Red Sea. The road has a total length of 538 miles and starts from Addis Ababa, which is at a height of 8,019 ft. above the sea. Then it steadily rises to a maximum height of 10,423 ft., which is reached at Debra Sina. From this point there is a series of descents to sea level. The road has entailed the construction of a large number of bridges and also of four tunnels, the longest of which has a length of 1,922 ft.

Important Towns Retain their Tramcars

One of the effects of the war has been to prolong the life of tramcars in this country. At the outbreak of war many towns were planning to replace their tramway systems by other forms of transport, such as trolley buses or oil-engined buses. Most of these schemes have now been abandoned and tram routes are being retained until happier days return. Among the towns that have decided to postpone their conversion schemes are Blackburn, Bristol and Cardiff.

A Road and Railway Tunnel through the Andes

The Transandine tunnel, which penetrates the Andes between Argentina and Chile, in South America, was originally built for railway traffic only, but has now been converted in a manner to make it suitable also for motor traffic. The tunnel was built in 1910. Alterations have now been made to the tunnel itself and special roads have been constructed to give access to it at each end.

The tunnel cuts through the Andes at a height of 10,521 ft. It has a diameter of 16 ft. 5 in. at the widest point, and a height of 19 ft. 3 in. The railway track through it is so designed that on it a surface suitable for motor transport could be constructed. Motor traffic of course is suspended during the hours when trains are running through the tunnel.

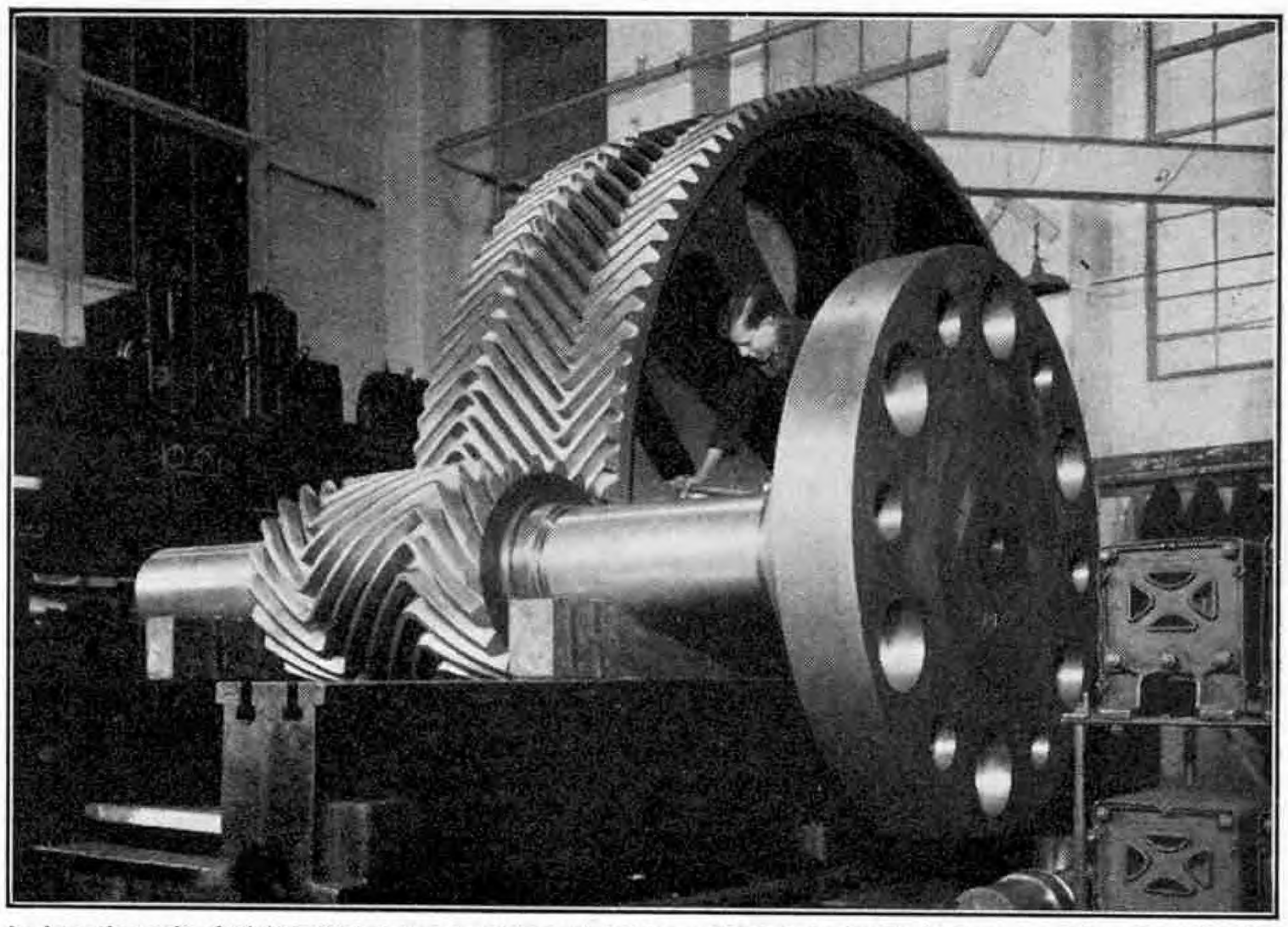
The opening of the tunnel to road traffic will increase by several months the period of the year in which it is possible to cross the Andes by motor car. The road through the Uspallata Pass that was formerly the usual route is blocked by falls of snow for nearly nine months in the year.

A Double-Decked American Bridge

A great combined railway and road bridge is to be built across the Pit River branch of the Shasta reservoir in the United States. The bridge will have two decks, the lower one of which will carry two railroad tracks, while the upper one will carry a 44 ft. wide road and two footpaths. The upper deck will be 530 ft. above the level of the stream bed. The central span will be 630 ft. in length, and there will be two other spans of 497 ft., three of 282 ft., and two of 141 ft. In addition there will be one girder span of 150 ft., and four of 141 ft. length.

Helical Gearing for a Mine Winder

The photograph reproduced below shows an imposing pair of triple helical gears that have recently been completed by David Brown and Sons (Hudd) Ltd., Huddersfield, for a winder in a South African gold mine. Together the gears weigh 25 tons, and are designed to transmit a maximum load of approximately 6,000 h.p. The cast steel wheel is nearly 16 ft. in diameter and is made in halves to facilitate handling and assembly on site, while the pinion is in one piece with its shaft and is cut from a forging of high tensile steel. The giant coupling is 4 ft. 8 in. in diameter and is bored to accommodate tangential folding keys.



An imposing pair of triple helical gears recently completed for a mine winder by David Brown and Sons (Hudd) Ltd., to whom we are indebted for our photograph.

From Our Readers

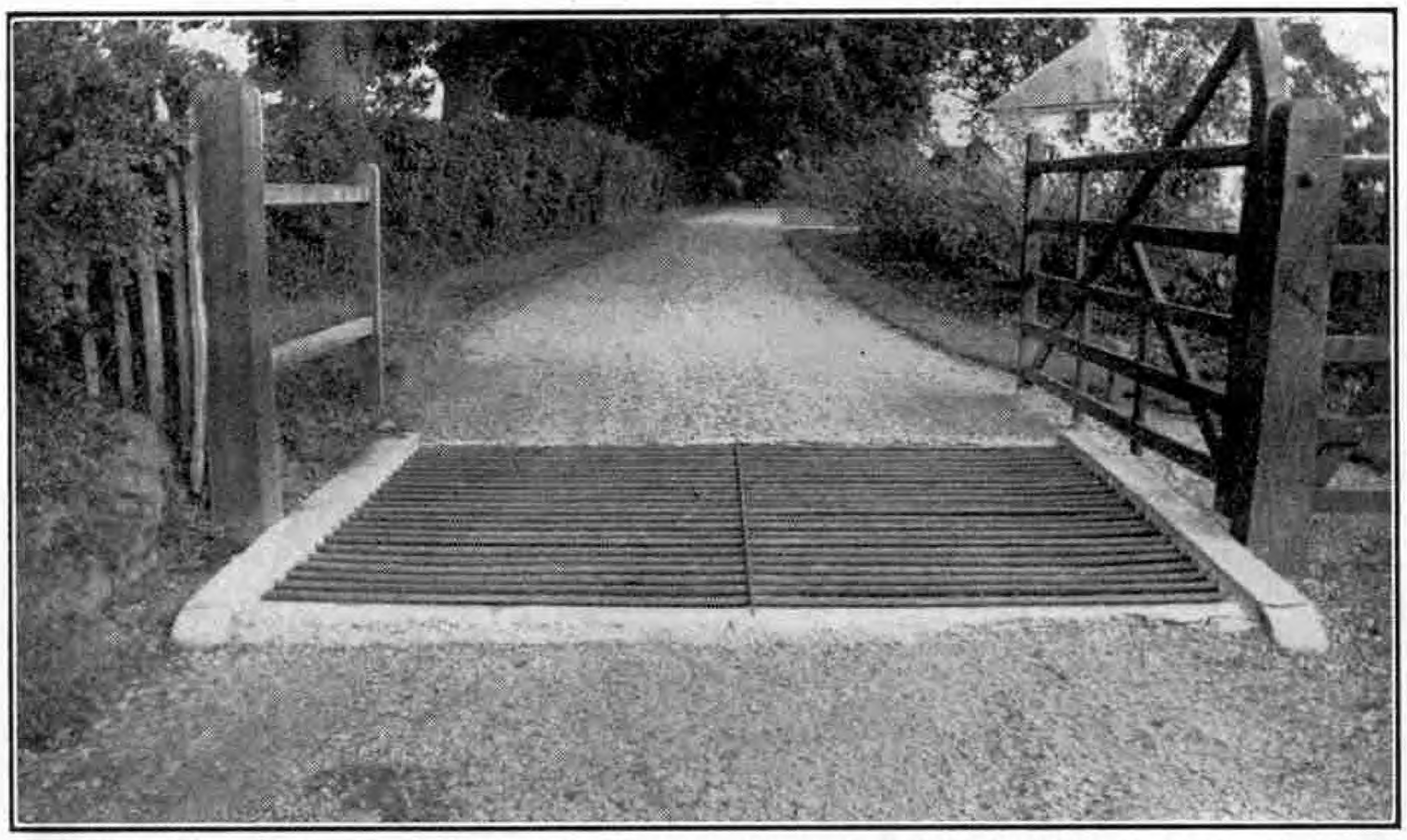
These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A Problem for Ponies

On a walking tour in the New Forest last year I was puzzled by curious gratings seen at the entrances to the drives of large country houses. One of these gratings is shown in the accompanying photograph. In conversation with local residents I discovered that the device was provided to stop animals from entering the grounds and damaging the gardens. The gate may be left open for the passage of cars or pedestrians, but neither forest ponies nor cattle will pass over the iron grille.

The trap, if such it may be called, consists of a concrete-lined pit about 3 ft. deep and extending the full width of the entrance. Across this pit, at about ground level, are iron rods strong enough to support a vehicle, but they are spaced 2 in. or 3 in. apart and thus offer an insecure foothold to four-footed creatures. In addition, the noise produced by hoofs coming in contact with metal is sufficient to scare an animal that has never encountered anything so hard before.

Before the adoption of these gratings, a few years ago, it was common for a beautiful garden to be wrecked during the night by a herd of forest ponies.



The grille that prevents ponies and cattle from straying into country gardens. Photograph by P. Lawrie, London S.W.19.

They could only be excluded by keeping the gates shut, thus causing considerable inconvenience to drivers. The grounds are thoroughly protected by this effective device which, although simple to human understanding, is beyond the comprehension of forest animals.

Another very interesting use that has been found for this device is in keeping deer within parklands or wooded regions through which highways run. By placing traps at the entrances to these grounds free access is given for road traffic, and yet the deer are kept within bounds by their fear of crossing the bars. Other readers of the "*M.M.*" no doubt can give interesting examples of similar uses.

P. Lawrie (London S.W.19).

The Queen Eleanor Crosses

The Queen Eleanor Crosses are perhaps the most famous in England and certainly are the most elaborate. Queen Eleanor died at Harby, Nottinghamshire, in 1290, and King Edward I directed that stone crosses should be erected at each spot where her coffin rested on its way to Westminster. Of the 12 crosses erected, between 1291 and 1294, only three remain. These are at Geddington, Northampton and Waltham. All three are spire-shaped with three storeys. The bottom storey has each side carved with Gothic tracery dividing it into two panels, sculptured with armorial shields. Each niche of the second storey is occupied by a Queen Eleanor statue.

The Geddington Cross is over 40 ft. high and is triangular in shape. It stands in a Northamptonshire village, five miles from Kettering, in which, according to a tradition, squirrel-baiting was once a favourite pastime. Wild squirrels were released near the cross and hunted by a shouting crowd until they took refuge in the carved pinnacles. They were then pelted with stones, driven out and killed. Unlike the other crosses, it has three sides. It was built over a spring, and water still pours out from under its ancient foundations.

Northampton's octagonal cross, with its nine octagonal steps is the most beautiful of the Eleanor crosses. It stands on a roadside with a background of trees. The four sundials of the top storey were added when the cross was restored in 1713. The present broken shaft on the summit was erected in 1840 to replace the actual cross, which disappeared centuries earlier. The crosses that have disappeared were at Lincoln, Grantham, Stamford, Stony Stratford, Dunstable and St. Albans, with one in London and the last in Charing Village, now Charing Cross. All these places were on the route. T. Jordan (Manchester).

To Australia in a Freighter

I have always longed to go to sea in a sailing ship, but when I went to Australia last summer it was in a modern freighter. Still, I was at sea, and to an ignorant landlubber like myself the voyage was a revelation.

The amount of work that had to be done astonished me. There were the usual routine duties, such as navigation, steering and keeping a lookout, and in addition there were many other tasks. The ship's superstructure had to be painted, and throughout the voyage all paint work had to be kept spotlessly clean. The deck was scoured with hefty holystones, fastened to broom handles, or scrubbed with caustic soda, and the bridge deck was polished with coconut shells, a remarkably efficient method. Holds also had to be prepared for their cargo of chilled meat, the meat hooks had to be sterilised and the derricks rigged for use in port. During one stage of the round trip from Melbourne to Capetown the midshipmen became shepherds, attending 256 rams that were carried on the boat and poop decks.

There were many episodes in this hard but healthy life that I shall never forget. One was being dwarfed as the vessel slid under Sydney Harbour Bridge. Another was anchoring by night in Table Bay, where black waters reflected the lights of Capetown climbing up the slopes of Table Mountain. Tossing about in an unpleasant Cape swell, on the foc'stle head when leaving port, lazy days crossing the Equator, disturbing shoals of flying fish and schools of porpoise, and nights under the bright panoply of the Milky Way, with the brilliant Southern Cross above us, were other impressive experiences.

J. W. Saunders (Liverpool).

Making Locomotives

I once had the privilege of making a tour of the locomotive works of the L.M.S. at Derby. On the tour I saw steam hammers beating out red hot bars of steel into strips for the making of springs. The wheelshop proved particularly interesting, for wheels were being forced on their axles by a pressure of 600 tons. In the axle-turning, tyre and flanging shops we saw much interesting plant, including boring mills, gas-fired furnaces for expanding the tyres before fixing them on the wheels, hydraulic flanging rams, drilling machines and hydraulic riveting plant.

Next we passed on to the forging shop, in which there were heavy forging and drop-stamping machines. In the large foundry 12,000 chairs for rails are turned out every week. Finally came the erecting shop, where the engines are actually built from their parts. From here they pass on to the fitting and paint shops. In the latter I saw several modern engines being painted, and there were also two full sized models of the "*Rocket*," George Stephenson's famous locomotive. Other interesting records of early railway days were in the Museum.

P. B. Lee (Coventry).



A swan on her nest in the Crumbles, Eastbourne. Photograph by A. M. Turner Ettlinger, Eastbourne.

Bird Life on the Crumbles

An excellent place in which to see birds of very many species is the Crumbles at Eastbourne. Each wild place possesses a fascination of its own, and the Crumbles is no exception. Its western boundary is Eastbourne Town, and its eastern the bungalows of Pevensey Bay. Every year these two advance and swallow up a little more of the Crumbles, but birds still hold on there, and I hope will continue to do so for many years to come.

Cover on the Crumbles is varied. There are large shallow ponds, with small reed beds, fields of rushy bogginess, clumps of thorn and gorse, and small copses of stunted sallow. For the most part there are only occasional tufts of rank grass or low-growing herb in the bare pebbles, however. At one place a mechanical excavator has dug to a depth of 5 ft. or 6 ft. in the shingle, leaving in its wake a large flat extent of small stones that is unlike the top level, which is composed of large stones and lies in wave-like ridges.

In winter, and during the autumn and spring migrations, hordes of birds pass through the Crumbles, including waders of almost all species, and surface and diving duck. In summer many commoner species breed there. There are usually some half dozen pairs of ringed plover and three or four of redshank. Among the smaller birds there are red-backed shrike, nightingale, reed bunting and yellow wagtail, which once even nested in hollows specially constructed for them in the shingle.

By far the most interesting birds to be seen on the Crumbles, however, are the common and lesser terns, which breed there still, though they are decreasing in number. Their nests are very easy to find, although the eggs are difficult to see on the stones. Eggs of both species are not laid before the end of May. Those of the lesser tern are smaller than those of the common tern, and always have a paler ground colour. With both the number is two or three. The common tern makes a small nest of dead grasses; the other lays on the bare shingle, often making a lining of white pebbles for its eggs. The terns feed about a hundred yards off shore, and it is a fine sight to see one dart down to the water to seize some small fish, and then bear it back to the breeding ground, held crosswise in its beak. Altogether the bird life of the Crumbles can surely be described as fascinating to the nature lover.

A. M. Turner Ettlinger (Eastbourne).

A Cruise in Scottish Lochs

While staying in Scotland last summer I enjoyed many cruises in Scottish lochs. There is some of the most beautiful scenery in Scotland around these lochs, with mountains coming right down to the edge of the water and pretty villages in the valleys, and splendid boats ply between places on their shores.

One of the best cruises that I had was from Dunoon up Loch Goil and Loch Long in turn in the *"Marmion,"* a paddle steamer. We called at Lochgoilhead, where a few passengers left us, to be picked up on the return trip, and as we steamed down Loch Goil again we were amused by seagulls, following the boat, that were very clever in catching food thrown to them.

Our next call was at Arrochar, at the head of Loch Long, and there the steamer waited an hour while we roamed about on shore. The road between Dumbarton and Inverary runs round the head of the Loch, and alongside of it is an old road that is now disused. Over a little stream running into the Loch is a narrow bridge, on which stands a curious stone marking the boundary of Argyllshire and Dumbartonshire. On the stone are marked the distances to Inverary and Dumbarton, measured accurately in miles and furlongs. We should have enjoyed exploring further, but we were recalled by the *"Marmion's"* siren.

J. Hurst (Horsham).

They are still Tough in the West!

One feature of the old West which has not yet given way entirely before the advance of modern civilisation is the lone prospector. I met one of these interesting characters while on a fishing trip in one of the remoter parts of British Columbia. I caught my first glimpse of the old man as he bent over his somewhat primitive tools, which comprised a deep pan, a shovel and a large crowbar.

After enchanging general remarks, I asked about his occupation. His method was simple, but quite effective. Coming upon a large boulder, he would lever it over with the crowbar, and place some of the deposit, or "pay-dirt," found under it in his pan along with some water. Then with a motion apparently known only to the initiated, he would swill the water and sand out and leave only the gold and a little heavy impurity in the pan. This labour netted him roughly two dollars and a half, or about 10/–, a day, and of course there was always a chance that he might "strike it rich."

Before I moved on, I asked him if he registered his claims. He replied that he was not on them long enough to make it worth while.

"What would you do if someone attempted to jump your claim?" I enquired, and his reply was: "I have my thutty-thutty." Then for the first time I noticed his revolver, his "thutty-thutty" as he called it.

Ross Buchanan (Calgary).

Collecting Cave Insects

Many thousands of years ago, when the Earth was passing through the last phases of the ice age, the greater part of England was covered with a gigantic ice cap. This river of ice terminated short of Somerset, where insects and animals were still living, and there, deep down in the caves of the Mendips, there might reasonably be small insects of the same primitive form as those that lived and thrived in prehistoric ages.

Let us follow the path taken by a party looking for cave insects in Swildon Hole, one of the better known Mendips caves. After obtaining a key from a farmhouse near by, they follow the bed of a stream to an ash tree, at the foot of which it disappears through a grating in the ground. The lock at the side is undone, and the explorers, clad in dungarees and miner's helmets, squeeze through. Immediately all is lost in the sound of running water, which runs about two inches deep over their boots as they scramble across it. They pass a little waterfall and up through a hole in the roof, and find themselves in a maze of narrow passages that twist and turn, and branch off every now and then.

Soon a cluster of stalactites and stalagmites is passed on the left, and below them is a long clay bank. Here is the hunting ground. On looking closely a score of little white specks about as large as the eye of a needle are seen, and these hop about when the light from a torch approaches. They are probably quite blind, yet they react to strong light.

The collecting apparatus is now taken out. It consists of a corked test tube, to which are connected two rubber tubes, one shorter than the other. The collector places the end of the short tube near the insect and sucks strongly at the nozzle of the long one. The result is to draw the insect up into the tube.

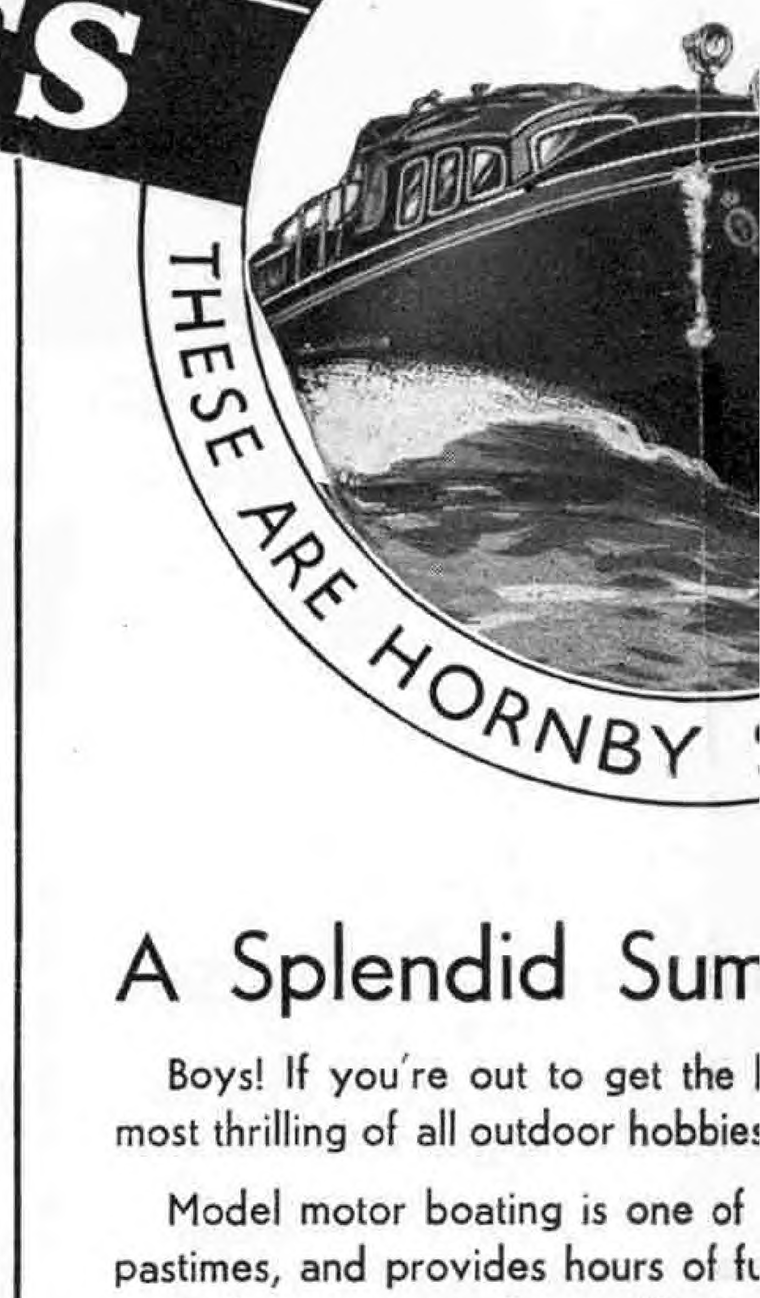
After making a collection the party continues through gradually widening chambers. They come back up the stream, and after a crawl through the water they are out in the open with a haul of insects.

M. A. Glennie (Berkhamsted).

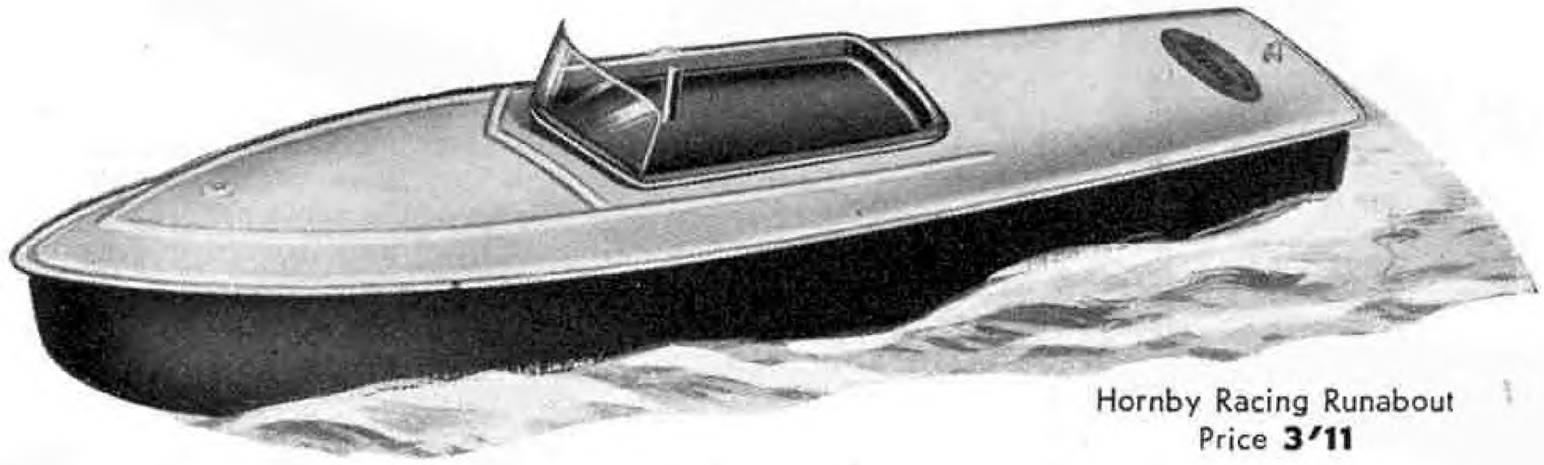


At the head of Loch Long, where the road between Dumbarton and Inverary passes. Photograph by J. Hurst, Horsham.

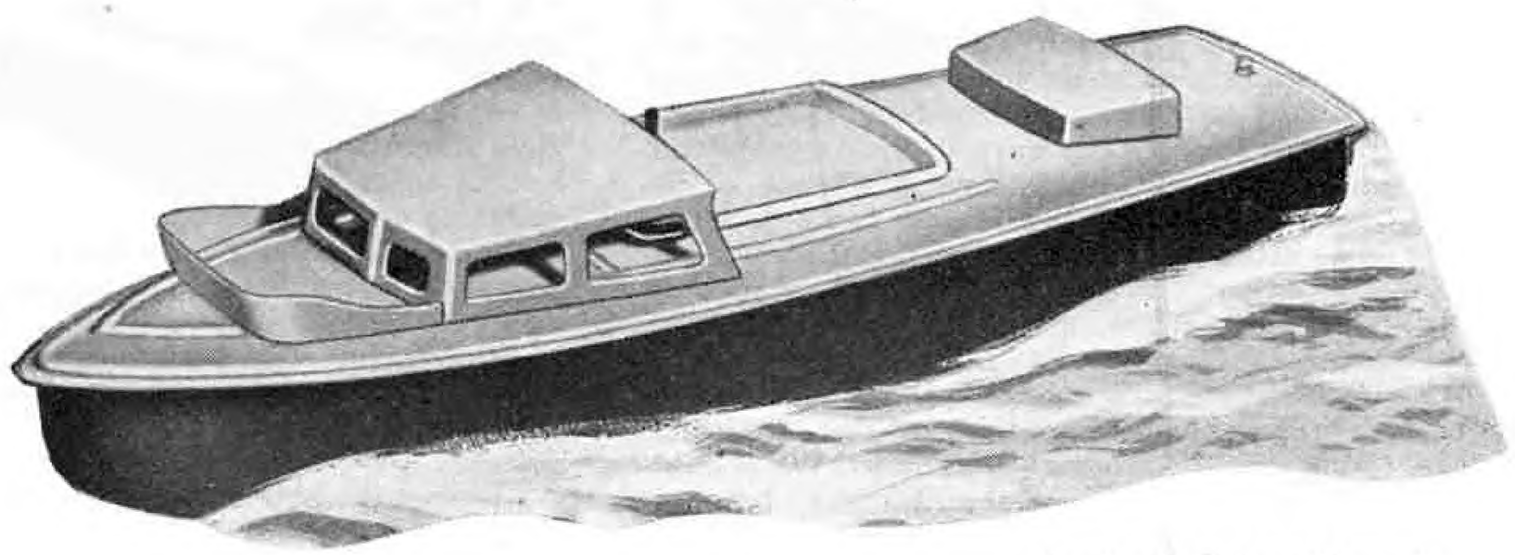
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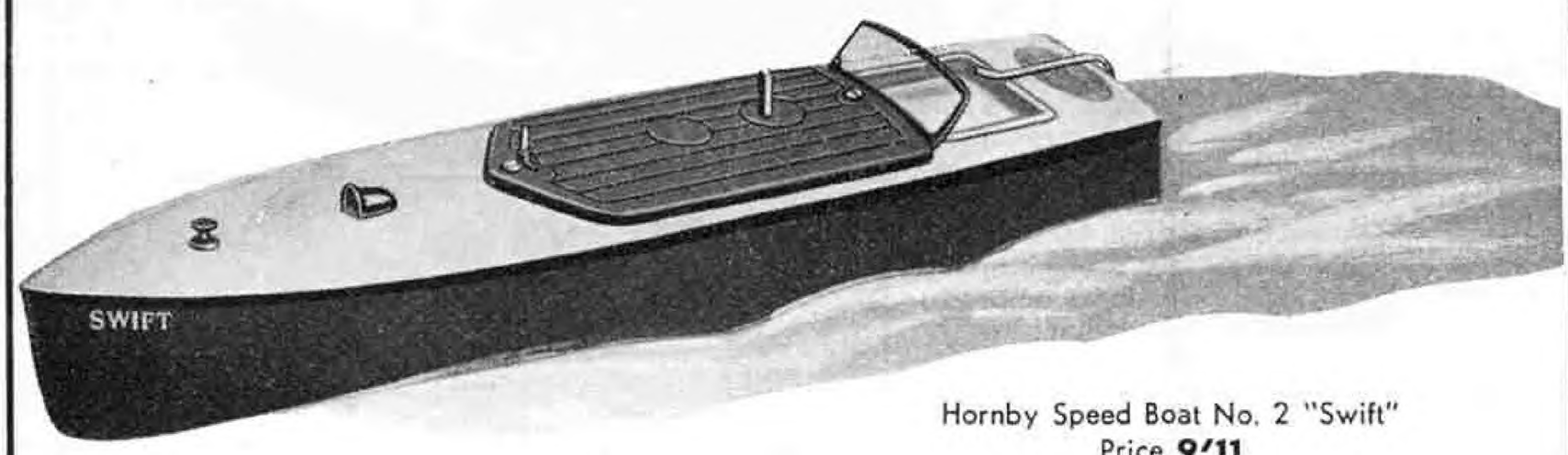
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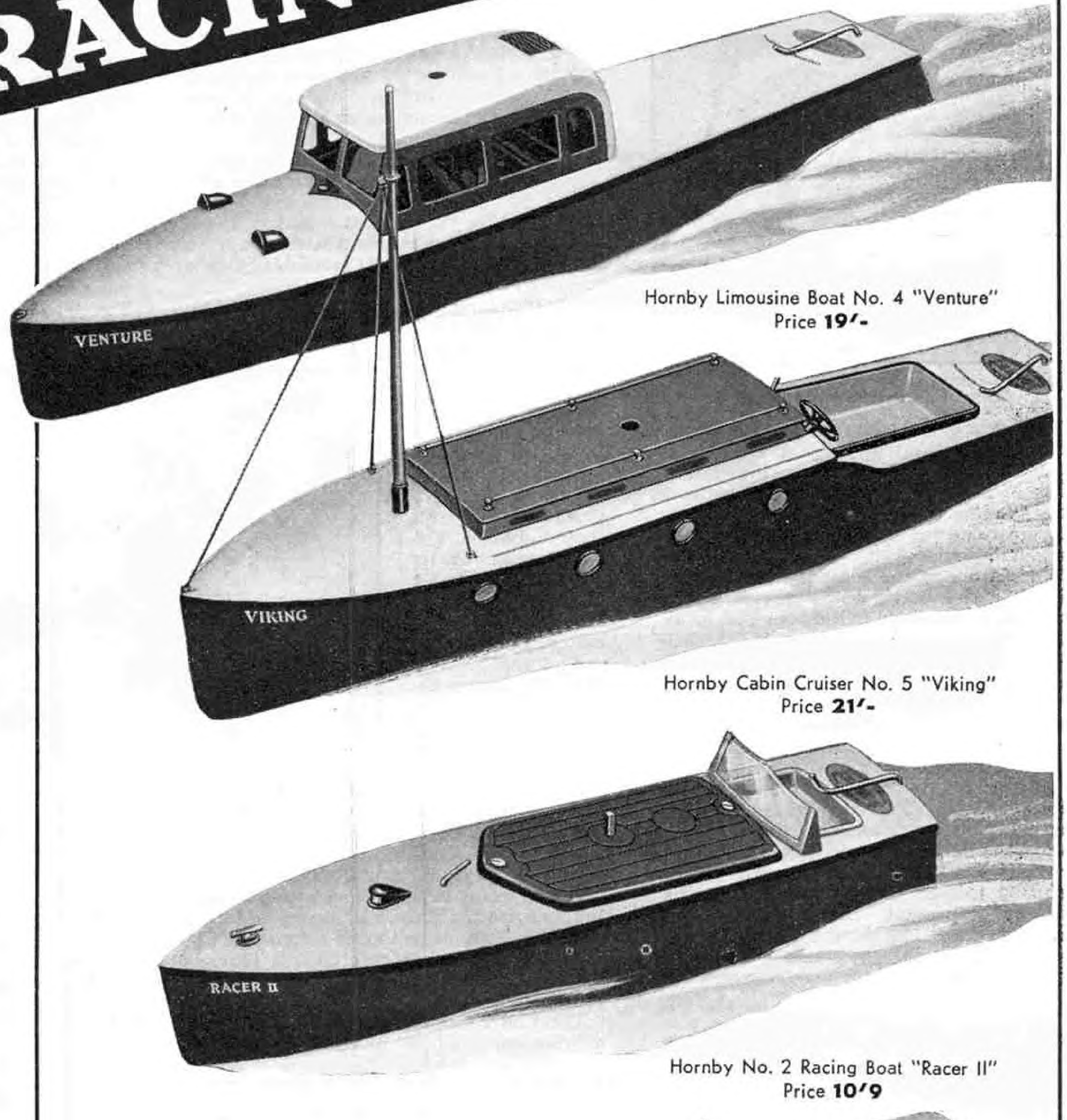
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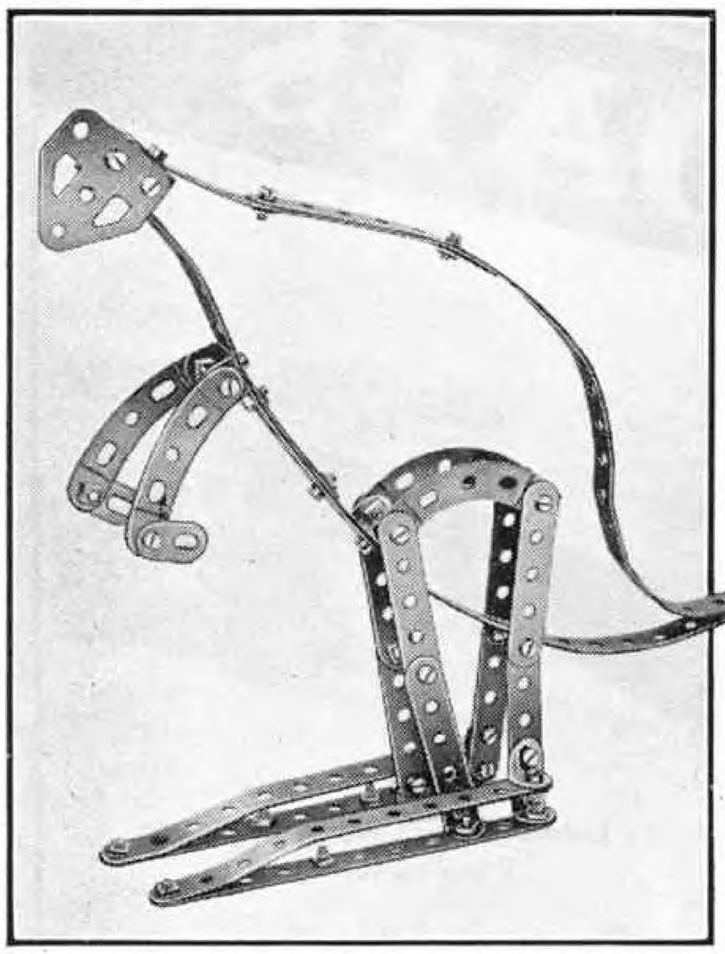


Fig. 1. An outline model of a kangaroo. It can be built from the parts in Outfit No. 3.

New Meccano Models

Kangaroo—Weighbridge—Wire Covering Machine

THE first of the three new models we are describing this month is a simple outline model of a kangaroo shown in Fig. 1. The body of the animal sways to and fro in a very life-like manner, and its movements will create lots of fun for the young model-builder.

The outline of the body and tail consists of 12½″ Strips bolted to 5½″ Strips, which are bent to the required shape. The head, consisting of a Flat Trunnion, is attached to the neck by two Angle Brackets. Each hind leg is represented by two compound strips, the top of each being joined to the ends of a 2½″ Cranked Curved Strip that is fixed to the body by means of an Angle Bracket. The rear pair of compound strips are connected by a ⅜″ Bolt that carries several Washers. Two 5½″ Strips, shaped as shown in the illustration, are attached to the compound strips by Angle Brackets to form feet. Two 2½″ Cranked Curved Strips attached to each side of a Double Angle Bracket, represent the forelegs. Flat Brackets are bolted to the Curved Strips to form the paws.

Parts required to build the model kangaroo: 2 of No. 1; 6 of No. 2; 8 of No. 5; 2 of No. 10; 2 of No. 11; 8 of No. 12; 41 of No. 37a; 40 of No. 37b; 6 of No. 38; 4 of No. 90a; 1 of No. 111c; 1 of No. 126a.

The second model to be described is the fine weighbridge shown in Figs. 2 and 3. It is designed for construction from the parts in Outfit No. 5 and can be used for weighing small loaded railway trucks.

The frame of the model is formed by four 5½″ Strips 1 joined together by Angle Brackets. To three of the Strips 1 are bolted 5½″ × 1½″ Flexible Plates, while to the fourth Strip a 5½″ × 2½″ Flexible Plate is secured in an upright position.

The weighing mechanism is assembled by first mounting a 5″ Rod 3 in position by two Reversed Angle Brackets. This Rod carries two 3½″ Strips, which are held in place on it by Spring Clips and are joined by two 3½″ Rods 4 and 5 passed through their end holes. The Rod 4 carries at its centre two Angle Brackets, to which a 5½″ Strip 6 is bolted. To the upper end of this Strip a Flat Bracket is secured by two ⅜″ Bolts, each of which carries four Washers on its shank to space the Flat Bracket and the Strip apart. A compound rod 7 consisting of a 3½″ and a 2″ Rod joined by a Rod Connector is passed between the Flat Bracket and the Strip, and is pressed into a Rod-Strip Connector that is bolted to a 2½″ Strip. The 2½″ Strip is pivoted on a Threaded Pin 8, which is mounted on a Flat Trunnion bolted to the Flexible Plate 2.

The Rod 7 forms the indicator bar of the weighbridge and is fitted with two 1″ Pulleys to represent sliding weights. Additional balance weights are provided by three 1″ Pulleys attached to the end of the 2½″ Strip and a ½″ Pulley mounted on a 3″ Screwed Rod secured to 5½″ Strip 6. A 5½″ Strip is bolted to the top of the 5½″ × 2½″ Flexible Plate 2, so that it is possible to judge when the indicator rod is horizontal.

The platform consists of three 5½″ × 2½″ Flexible Plates overlapped. The platform carries rails formed by two 5½″ Strips, and underneath it are bolted two Trunnions. The latter carry two Flat Brackets that serve to connect the platform to the ends of 3½″ Rod 5 of the weighbridge mechanism.

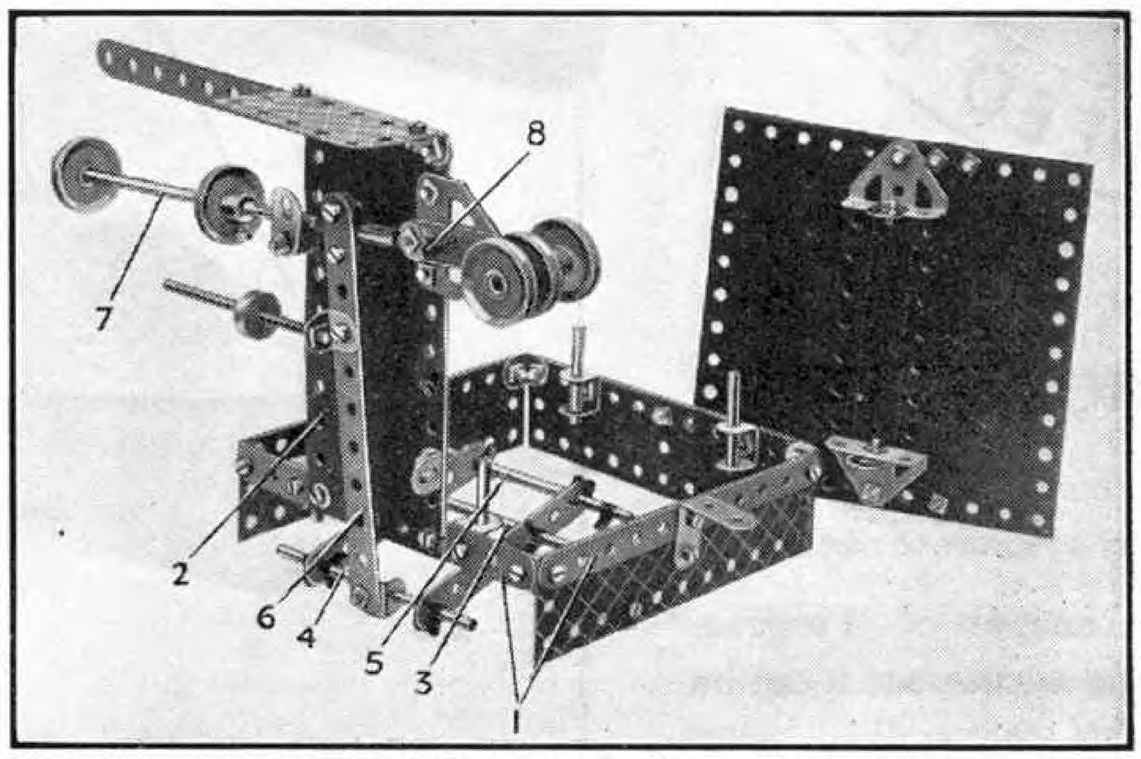


Fig. 2. The weighbridge of the model shown in Fig. 3, with the platform removed to reveal the mechanism.

The casing is formed by a 5½″ × 2½″ Flanged Plate, to which a number of 2½″ Strips are attached, and it is secured to Flexible Plate 2 by a 2½″ × 1½″ Flexible Plate and Angle Brackets.

Parts required to build model weighbridge: 8 of No. 2; 2 of No. 4; 5 of No. 5; 4 of No. 10; 4 of No. 11; 12 of No. 12; 2 of No. 12a; 4 of No. 12c; 1 of No. 15; 3 of No. 16; 2 of No. 17; 4 of No. 18a; 4 of No. 22; 1 of No. 22a; 1 of No. 23; 12 of No. 35; 52 of No. 37a; 50 of No. 37b; 14 of No. 38; 1 of No. 48; 1 of No. 52; 1 of No. 80c; 1 of No. 111a; 2 of No. 111c; 1 of No. 115; 2 of No. 125; 2 of No. 126; 1 of No. 126a; 1 of No. 188; 3 of No. 189; 4 of No. 192; 1 of No. 212; 1 of No. 213.

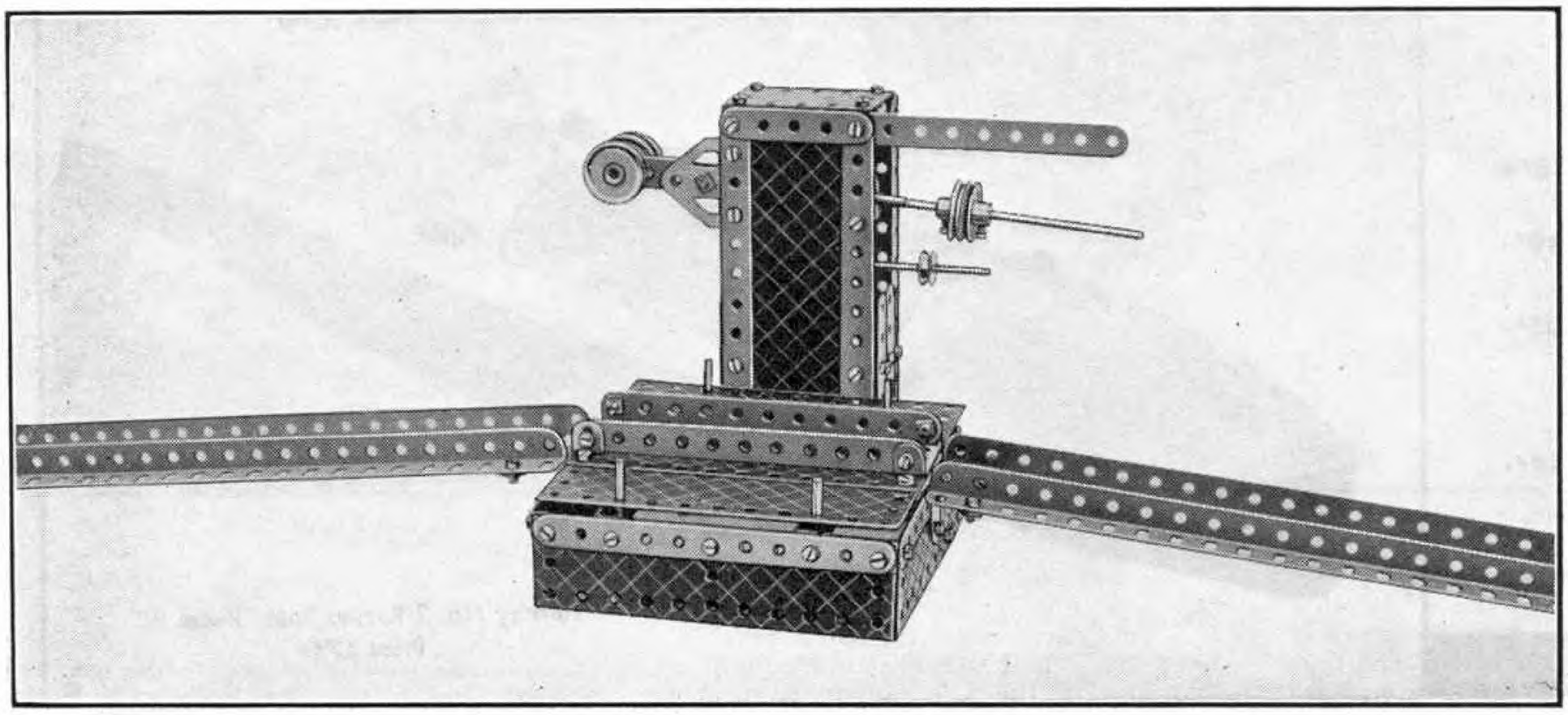


Fig. 3. A model weighbridge for trucks, which can be built from the parts in Outfit No. 5.

The wire covering machine shown in Figs. 4 and 5 on the next page is based on actual machines used for armouring cables with wrappings of steel wire or tape.

The model consists of a long base made as shown in the illustrations.

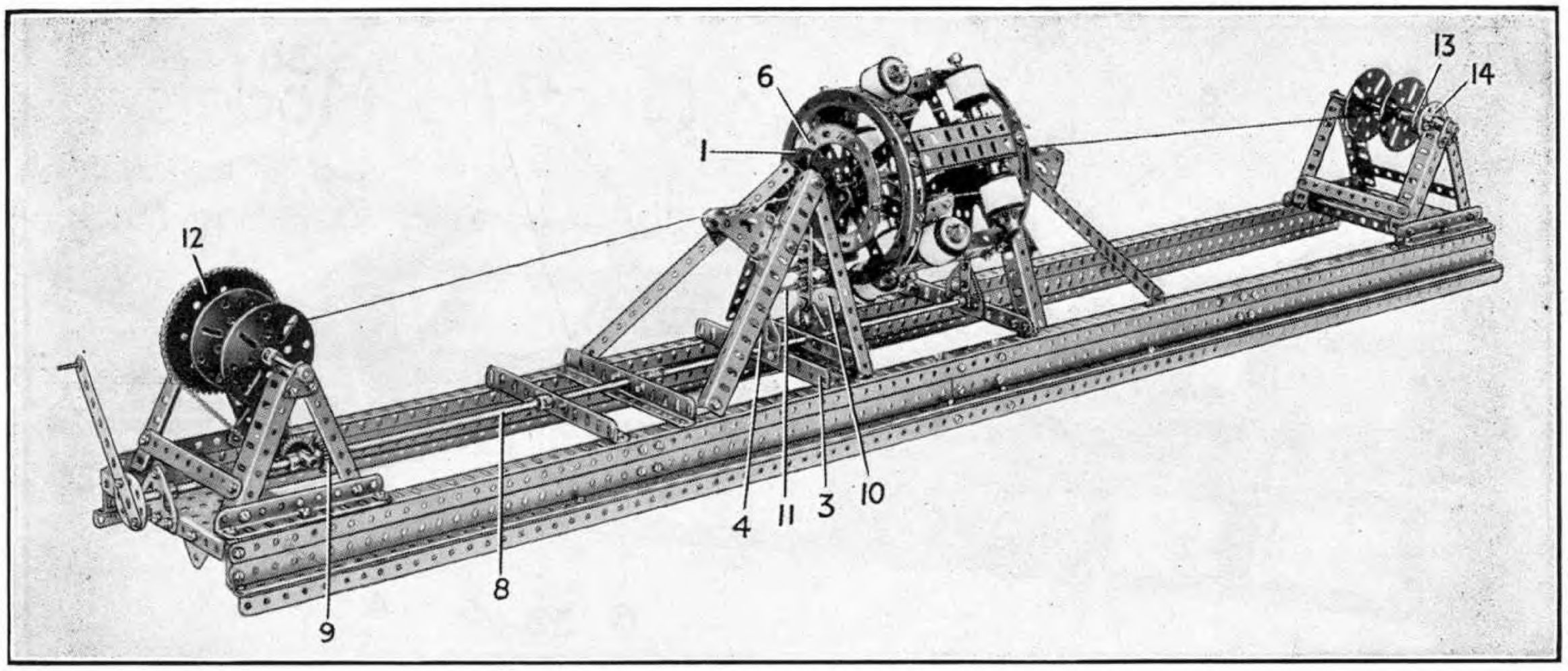


Fig. 4. A fine model of a wire covering machine of the type used for armouring cables.

The frame that supports the winding gear is commenced by bolting two 5½″ Angle Girders across the base and then fixing further 5½″ Angle Girders to their ends. These Girders support Face Plates 1 and 2, and pairs of 7½″ Angle Girders brace this structure. The bosses of the Face Plates project outwards. A Flat Trunnion 4 bolted to Girder 3, and a similar part on the adjacent Girder, support 3″ Strips. The Strip bolted to Trunnion 4 is connected to a 2½″ Strip attached to the sloping 7½″ Angle Girder, and the other is bolted to the Face Plate 1. A similar arrangement supports the Face Plate 2.

The mechanical part of the model consists of two Hub Discs joined together by eight 4½″ Angle Girders. One of the Hub Discs is fitted with a Gear Ring 6, which is spaced from it by Collars. A Coupling is attached by Angle Brackets to the Face Plate 1, and a second Coupling is attached to the first by Flat Brackets to form a hollow spindle. The second Coupling is passed through the centre hole of the Hub Disc and a third Coupling is attached to its end. Another Coupling similarly attached to Face Plate 2 provides a bearing for the Hub Disc.

Eight 2″ Rods are fixed by Double Arm Cranks to the 4½″ Angle Girders, and each Rod carries a reel of cotton. 1½″ Strips are now bolted to one of the Hub Discs between each set of reels as shown, and each Strip carries a 1″ × ½″ Angle Bracket.

The driving mechanism can now be added. First a long compound rod 8 is journalled in the base in the manner shown. This Rod is fitted with a ⅞″ Bevel Gear 9, Washers, a Coupling, a Collar, and a 2½″ Gear Wheel 10. Gear 10 engages with a ½″ Pinion fixed on a 2½″ Rod 11. A second ½″ Pinion fixed on a similar Rod meshes with the first Pinion and also with Gear 6.

Bevel Gear 9 drives a second similar Gear fixed on a 3″ Rod journalled in the Coupling, and also in the side of the base. A 1″ Sprocket Wheel on this Rod is connected by chain to the 3″ Sprocket Wheel 12.

At the other end of the base is a second 5″ Rod that carries two Face Plates, a 1⅛″ Flanged Wheel 13, a 1″ loose Pulley fitted with a Motor Tyre, and a Bush Wheel 14. The Bush Wheel is fitted with two ⅜″ Bolts lock-nutted to the boss, and these engage with the ends of the Angle Girders. The Bush Wheel makes contact with the Pulley and Flanged Wheel and so forms a friction brake.

Parts required for model wire covering machine: 2 of No. 2; 3 of No. 2a; 3 of No. 4; 1 of No. 5; 4 of No. 6; 6 of No. 6a; 12 of No. 7; 4 of No. 8b; 9 of No. 9; 12 of No. 9a; 8 of No. 9b; 4 of No. 9f; 6 of No. 12; 4 of No. 12b; 2 of No. 13; 6 of No. 15; 1 of No. 16; 1 of No. 16a; 2 of No. 16b; 2 of No. 18b; 1 of No. 20; 1 of No. 22a; 3 of No. 23; 2 of No. 24; 2 of No. 26; 1 of No. 27b; 2 of No. 30; 24 of No. 37; 4 of No. 37a; 1 of No. 37f; 1 of No. 37g; 2 of No. 38f; 2 of No. 52; 26 of No. 59; 9 of No. 62b; 5 of No. 63; 1 of No. 63c; 8 of No. 77; 1 of No. 94; 1 of No. 95b; 1 of No. 96a; 8 of No. 103b; 6 of No. 109; 6 of No. 111c; 1 of No. 115; 2 of No. 118; 4 of No. 120b; 4 of No. 126a; 4 of No. 133; 1 of No. 142c; 2 of No. 171; 1 of No. 180; 8 reels of Cotton.

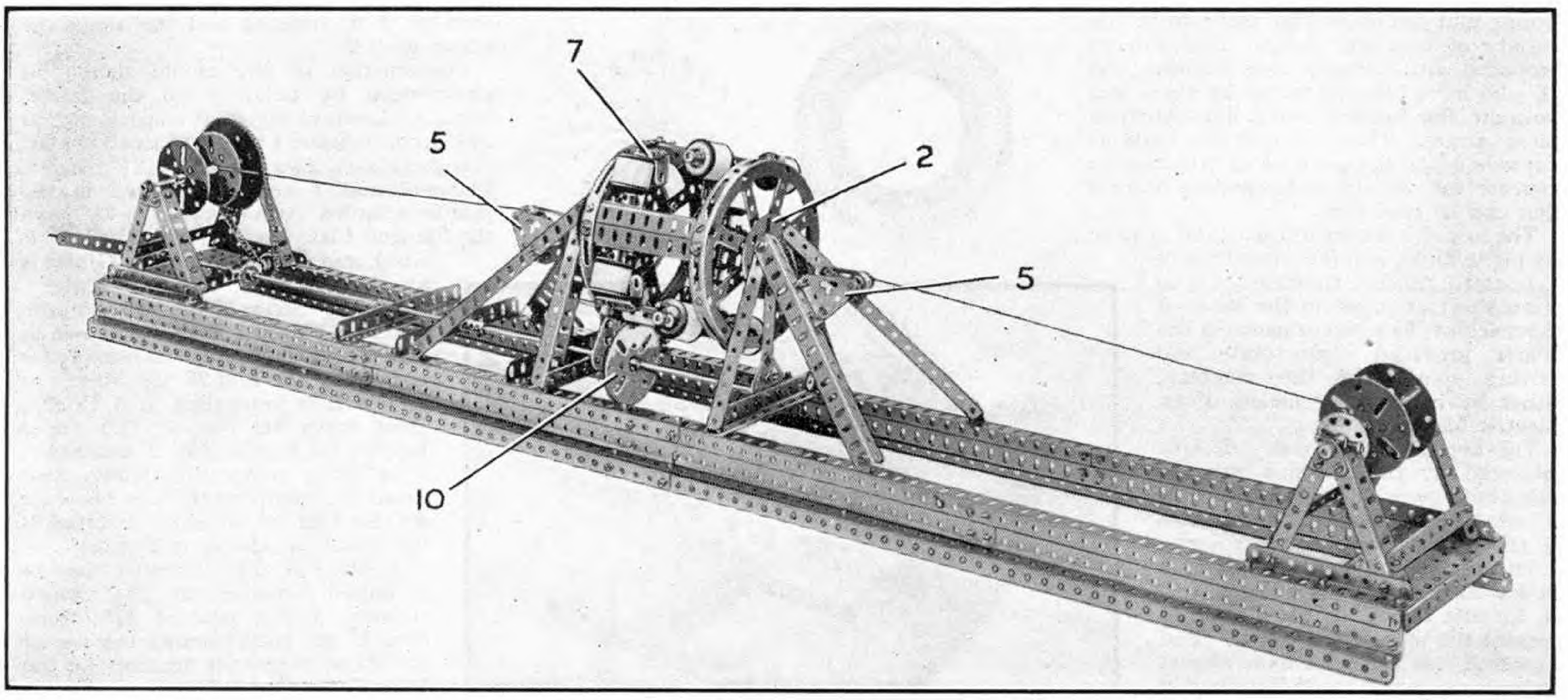


Fig. 5. Another view of the Meccano wire covering machine.

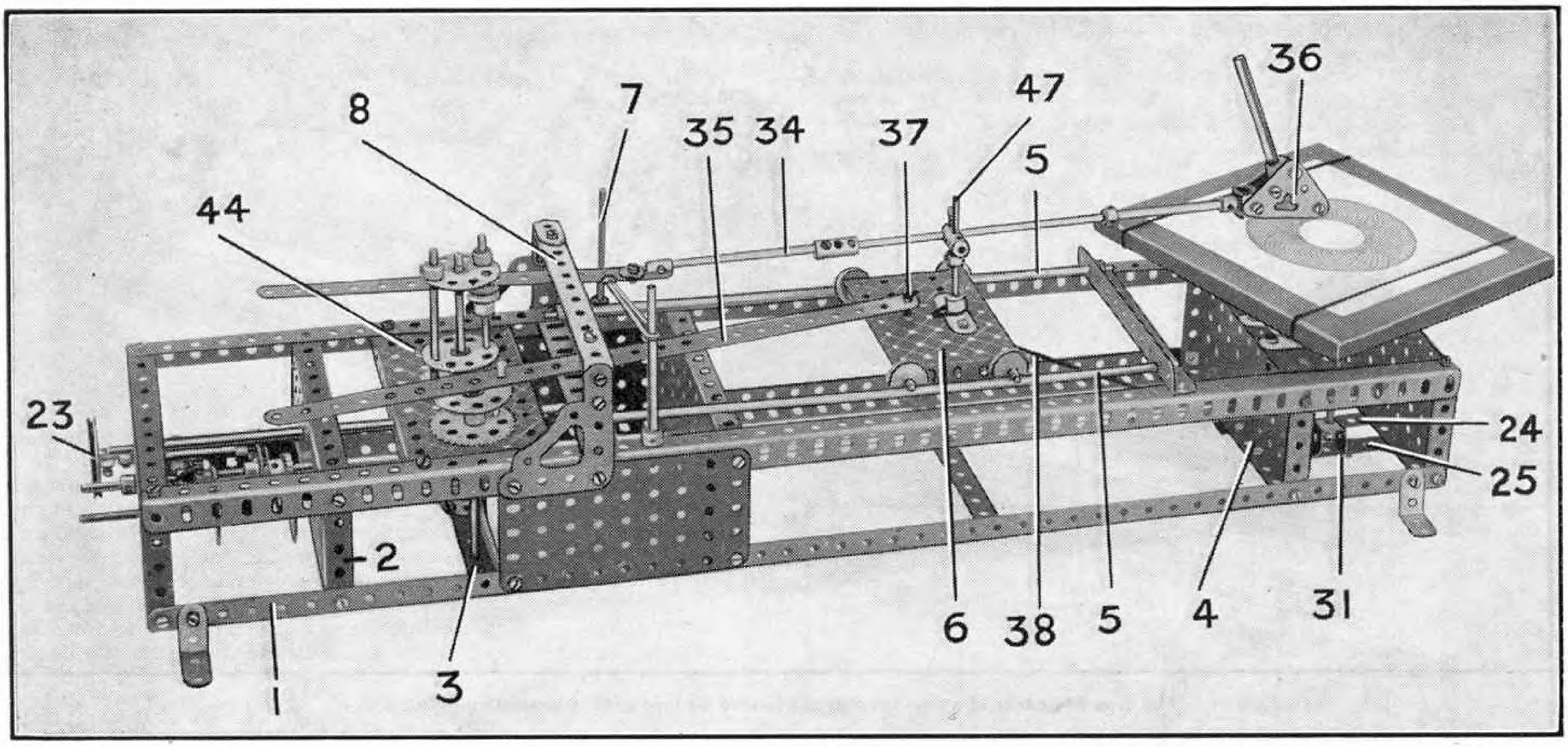


Fig. 1. General view of the new Meccanograph.

A New Meccanograph

Make Fascinating Designs With This Fine Model

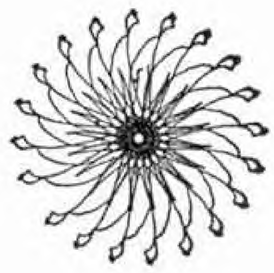
AMONG the limitless number of models that Meccano builds it would be difficult to find any other one that has excited so much interest as the Meccanograph, of which several versions have been described. Young and old alike find pleasure in the variety of beautiful designs that can be produced with this ingenious machine, and all who have been attracted by them will welcome the further model illustrated on these pages. This incorporates various improvements the purpose of which is to increase the variety of fascinating designs that can be produced.

The model is shown in Fig. 1 and is quite simple to build, and it is equally easy to operate. All that is necessary is to pin a sheet of paper to the table of the machine, fix a pen or pencil in the holder provided and rotate the driving spindle of the machine, either by hand or by means of an Electric Motor.

The appearance of many designs produced by the machine may be enhanced greatly by the use of coloured inks, or by filling in spaces in the designs with water colours.

The model is shown fitted with a Pulley 23 for taking the drive from an Electric Motor. If it is desired to operate the model by hand the Rod on which this Pulley is fixed should be replaced by a Crank Handle. On turning the Pulley 23 the Designing Table is caused to revolve. At the same time the writing arm 34 is actuated by the Rods 39, Fig. 4, which act like cams, and the pen is moved to and fro across the table. By a combination of these two movements an amazing number of different designs can be produced by varying the relative speeds of operation of the table and writing arm. This can be done by means of the gear-box at the front of the machine, or by varying the position at which the arm is pivoted to the carriage 6.





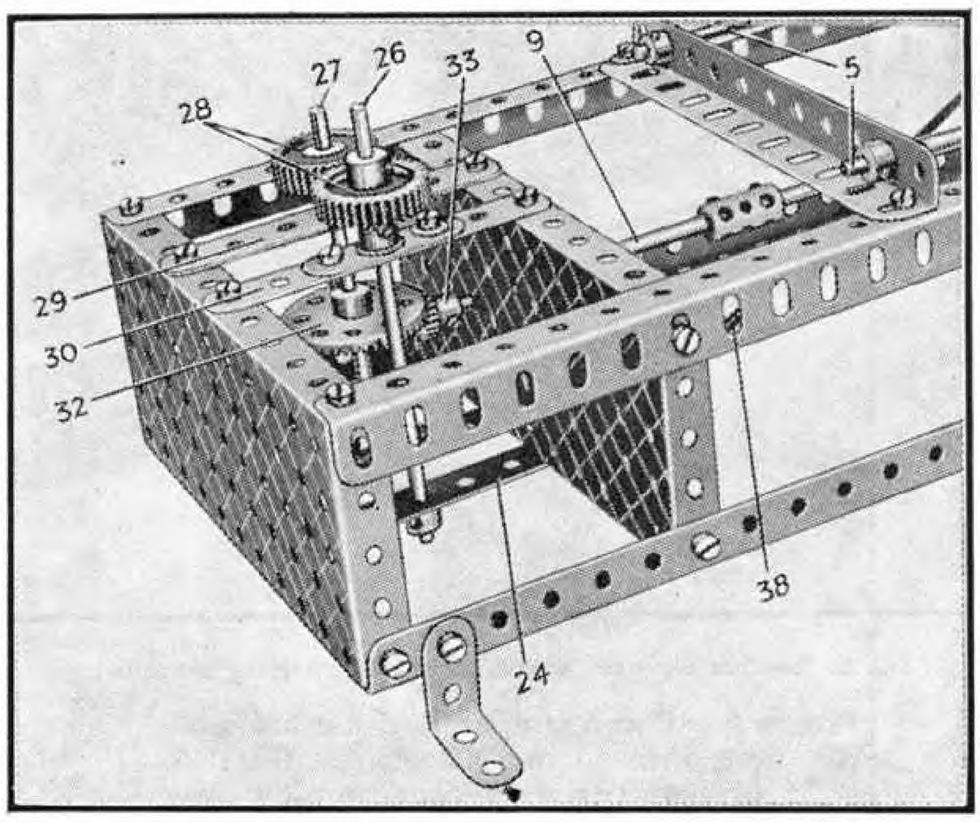


Fig. 2. The rear end of the Meccanograph, showing the table mechanism.

A further variety of movement may be given to the writing arm by causing the carriage 6 to slide to and fro along the guide Rods 5.

Construction of the model should be commenced by building up the frame, which is shown in Fig. 1. It consists of four 24½″ Angle Girders 1 bolted to two 5½″ × 2½″ Flanged Plates. Two other 5½″ × 2½″ Flanged Plates 2 and 4 are then bolted in the positions shown. At a distance of 2½″ from the Flanged Plate 2 a 5½″ Angle Girder 3 is fixed, and 4″ away from this Girder is another 5½″ × 2½″ Flanged Plate.

Two 3½″ Strips 29 are bolted to the two rear Flanged Plates as shown in Fig. 2, and they provide a bearing for one end of the Rod 27, the other end of which is journalled in a Double Bent Strip 31, Fig. 1. The upper bearing for Rod 26, Fig. 2, consists of a 3½″ Strip to which a Double Arm Crank is bolted, and the lower bearing for this Rod is a 3½″ Strip 24 bolted to the frame, as shown in Fig. 2.

Another 5½″ × 2½″ Flanged Plate 44 is bolted between the 24½″ Angle Girders, and a pair of 5½″ Angle Girders are bolted across the top of the frame to provide bearings for the Rods 5. Another 5½″ Angle Girder 3 is bolted across the bottom of the frame, centrally under the Flanged Plate 44. Architraves 45 are now bolted at each side of the machine, and to them two 5½″ Strips 46 are attached by means of 1″ × 1″ or ½″ × ½″ Angle Brackets.

The gear-box and the various Rods and gears of the table-operating mechanism are shown in Figs. 1, 2 and 3. The driving Pulley 23, Fig. 2, is mounted on a 4½″ Rod 22. A ½″ Pinion 16 on this Rod engages a 57-teeth Gear 17 on a 6½″ Rod 14, which is journalled in the Flanged Plates. Rod 14 carries also a ½″ Pinion 15 and a ¾″ Pinion 18. The third rod in the gear-box is a compound rod 9, which transmits the drive from the gear-box to the Designing Table. It consists of a 12½″, a 9½″ and a 3½″ Rod joined together by Couplings. At the gear-box end of this compound rod is a 50-teeth Gear 19, a ½″ Pinion 20 and a 57-teeth Gear 21.

In one of the alternative gear-trains that can be brought into use a ½″ Pinion 16 meshes with 57-teeth Gear 17, and Pinion 15

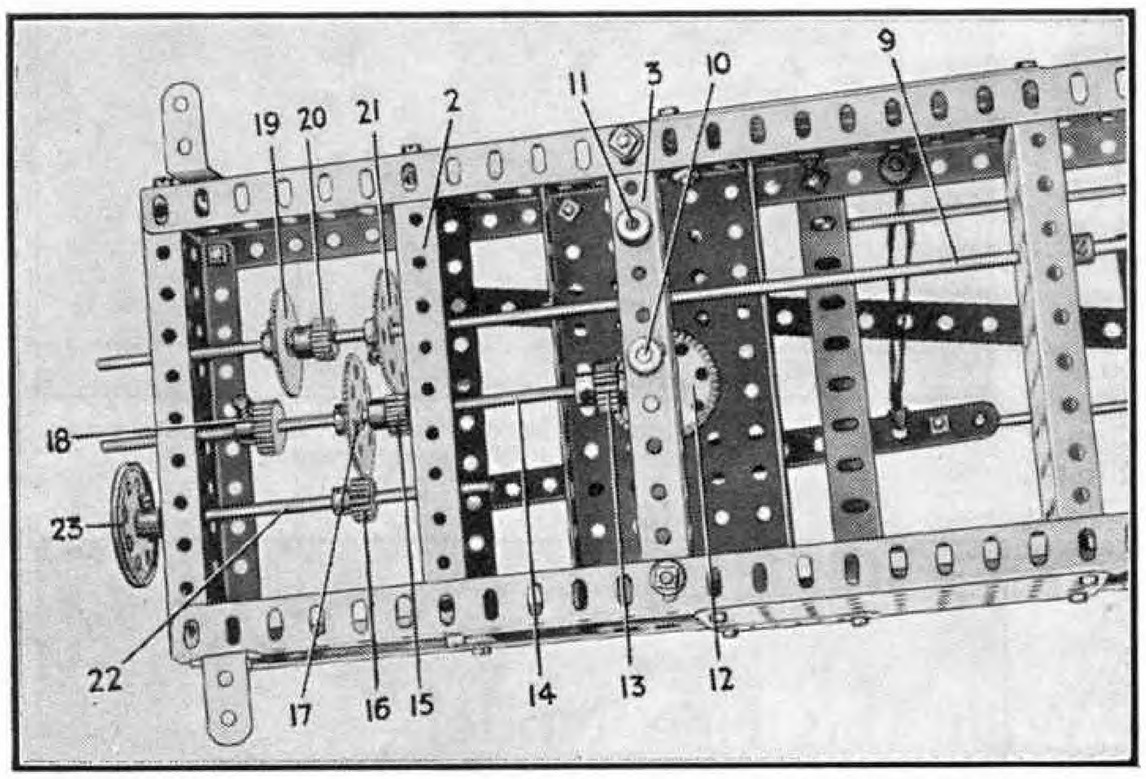


Fig. 3. This illustration shows how the drive is transmitted to the crown head.

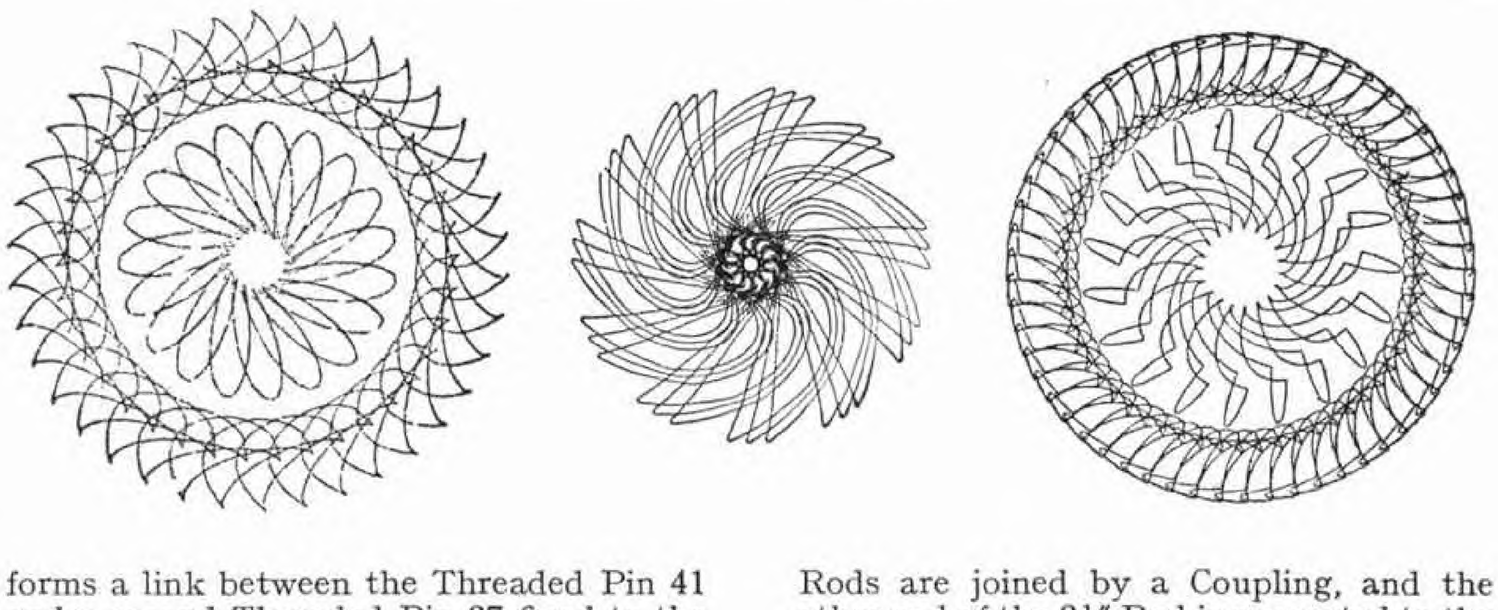
engages with 57-teeth Gear 21. The second gear train consists of Pinion 16 meshed with Gear 17, which in turn is meshed with Pinion 20. In the third gear train ½″ Pinion 16 meshes with 57-teeth Gear 17, and ¾″ Pinion 18 with 50-teeth Gear 19. It is important to note that only those gears included in a particular gear-train should be fixed to their shafts. Gears not actually in use at any time should have their set screws loosened so that they run freely on their shafts.

The mechanism that operates the side-to-side movement of the writing arm and moves the sliding carriage to and fro is known as the crown head, and is shown in Figs. 3 and 4. A 5½″ Rod 10 is journalled in Flanged Plate 44 and Angle Girder 3, and it carries a 1½″ Contrate Wheel 12 meshed with a ½″ Pinion on the end of Rod 14. A Collar is placed on the end of Rod 10 below Angle Girder 3. Above the Flanged Plate 44 Rod 10 carries a 57-teeth Gear 42 and two Bush Wheels, which are fixed to it in the positions indicated. Two 3″ Rods 39, each bearing a Collar, are pushed through holes in the two Bush Wheels, and one of the Rods is fitted with a ½″ Pulley 40. The Collars on Rod 10 are adjusted so that the Rods project into holes in 57-teeth Gear 42. By removing one of the Rods 10 or altering their positions in the Bush Wheels, it is possible to vary considerably the designs that can be produced on the machine.

The 57-teeth Gear 42 engages a similar Gear 43 mounted on a 3½″ Rod journalled in the frame. On the Rod above the Gear is a Bush Wheel, which is fixed in place boss downwards and has a Threaded Pin 41 fitted in one of its holes. This part of the crown head operates the sliding carriage 6 by means of a 12½″ Strip 35, Fig. 4, which forms a link between the Threaded Pin 41 and a second Threaded Pin 37 fixed to the carriage. The latter consists of 3½″ × 2½″ Flanged Plate 6, to which is bolted a Double Arm Crank. In the boss of the Crank is fixed a 2½″ Rod 47, which carries a Coupling mounted loosely on the Rod at right angles to it.

Two 4½″ Rods are pushed through the end holes in the flanges of the Flanged Plate 6, and each is held in place by two Collars placed on it inside the flanges. Four or five ¾″ Discs are then placed on the protruding ends of each Rod to act as guides and space the Flanged Plate centrally between the Rods 5. The movement of the carriage is smoothed out by means of a tension brake consisting of a 6″ Driving Band 38, Figs. 1 and 2. The Band is attached to the carriage and also to the base of the Flanged Plate 4.

The writing arm 34 is built up from a 7½″ Strip, a 3½″ Rod and a 7½″ Rod. The two



Rods are joined by a Coupling, and the other end of the 3½″ Rod is connected to the 7½″ Strip by a Rod-Strip Connector. The 7½″ Strip slides between the two 5½″ Strips 8, Fig. 1, and the longer Rod passes through the Coupling on the Rod 47 of the sliding carriage. The pencil or pen is gripped between two 1½″ Corner Brackets 36, which are bolted to the arms of a Large Fork Piece fixed on the end of the writing arm. Two ¾″ Bolts are placed in the free top holes of the Corner Brackets and one is passed through the holes in their front corners. The pencil or pen is placed between the two upper ¾″ Bolts and is pulled backward slightly by means of a piece of elastic until its lower end comes up against the front ¾″ Bolt.

Two 3½″ Rods 7 are fixed by means of Collars to the upper 24½″ Angle Girders of the frame, and these serve as points of attachment for one end of a 3″ Driving Band, the other end of which is passed around the 7½″ Strip of the writing arm. The Band may be attached to either of the Rods 7, and its purpose is to hold the writing arm against the Rods 39 of the crown head as the latter rotates.

The only part of the model that now remains to be described is the driving mechanism of the designing table. This is shown best in Fig. 2. The Rod on which the Designing Table is mounted is journalled in 3½″ Strip 24 and the Double Arm Crank bolted to the 3½″ Strip 30. A 1″ Gear 28 is fixed to it in the position shown. The drive is transmitted to the spindle of the table by means of a ½″ Bevel (*Continued on page 262*)

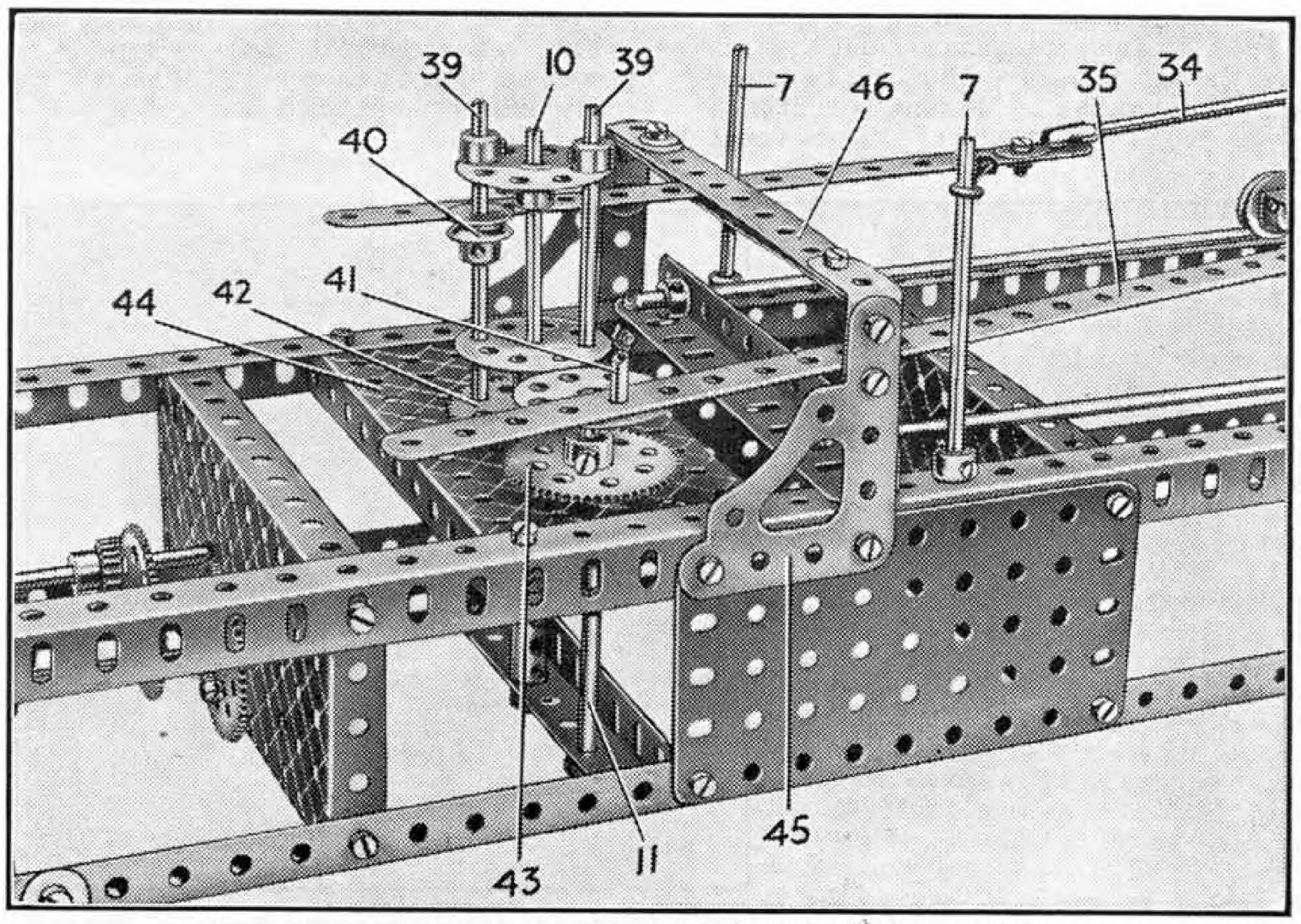


Fig. 4. The crown head, which operates the writing arm and the sliding carriage.

"The Allied Fighting Forces"

A Great New Competition Open to all Model-Builders

THIS month we announce details of a new competition for models representing the equipment of the Allied Fighting Forces. Models of any item of Naval, Army, or Air Force equipment are eligible for entry in this Contest, so that the range of subjects open to competitors is extremely wide and varied. Warships and patrol boats, searchlights, naval guns, aircraft, field and machine guns, tanks and armoured cars are examples of the models that may be submitted, and as illustrations of these and other subjects of a similar kind are easy to obtain competitors should have no difficulty in selecting a subject suitable for reproduction from the Meccano parts they possess.

There are no restrictions on the number of parts that may be used in building models for entry in this contest, and the main features that the judges will look for in making their awards will be, sound construction, neat finish and realism. The more closely a model resembles its prototype, both in outline and detail, the greater will be its chance of winning a prize.

It is most important to select a subject that is not too intricate or detailed to allow it to be reproduced fully and realistically from the Meccano parts the builder possesses. For example, it is useless for the owner of say, Outfit No. 3, to attempt the construction of a giant battleship. Subjects of this kind should be left to owners of really large Outfits, who will be able to reproduce all the details necessary to make such a model realistic. Owners of the smaller Outfits should choose the more simple subjects such as a naval pinnace or a searchlight.

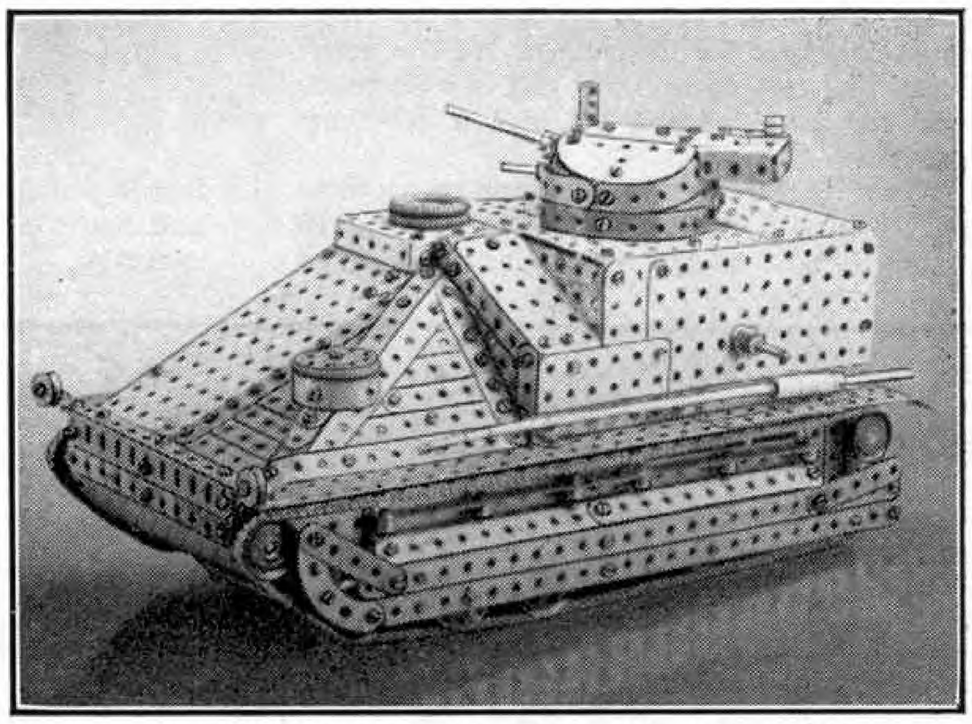
Entries will be divided into two sections. Those from competitors aged 14 and over will be placed in Section A; and those from competitors under 14 will be grouped in Section B. This arrangement, and the fact that the age of a competitor will be taken into consideration in deciding the merits of his work, will give everyone an equal chance of success.

After the model is built, a suitable illustration must be prepared. This may be either a good photograph or a drawing, but a photograph is best if it is possible to obtain one. The competitor should write his age, name and address on the back of the photograph or drawing, which should then be enclosed, together with a brief description of the model, in an envelope addressed *"The Allied Fighting Forces Model-Building Contest,"* Meccano Ltd., Binns Road, Liverpool 13.

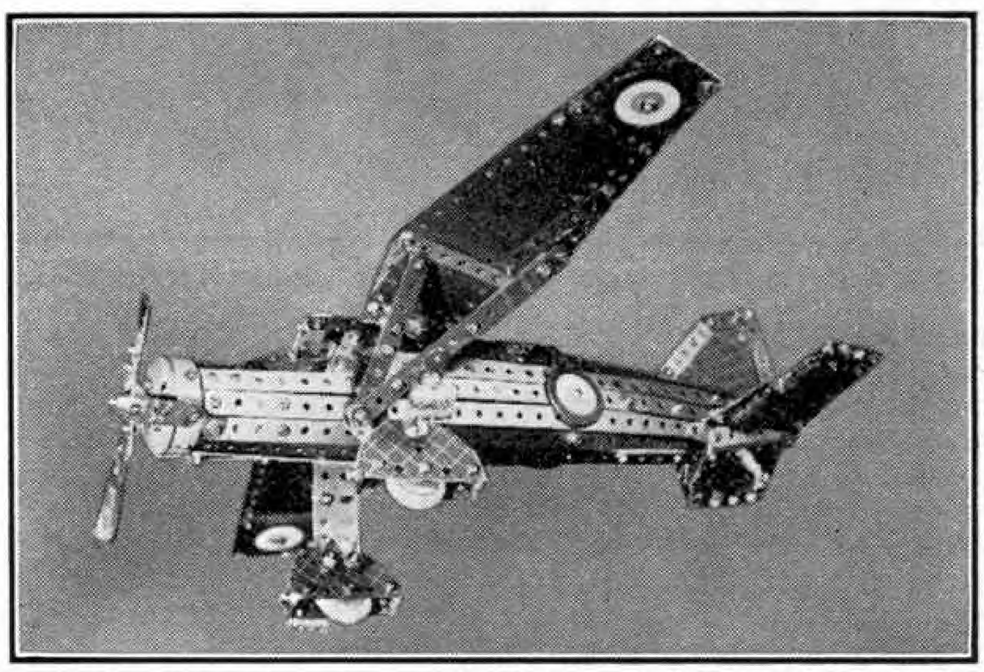
The full list of prizes to be awarded in each section for the best models received is as follows: First Prize, Cheque for £3/3/–: Second, Meccano or Hornby products value £2/2/–; Third, products value £1/1/-. There will be also 10 prizes of products value 10/6 and 10 of products value 5/–.

It should be noted that successful entries become the property of Meccano Ltd., but photographs of unsuccessful models will be returned provided that a stamped addressed envelope of the necessary size is enclosed with the entry for that purpose.

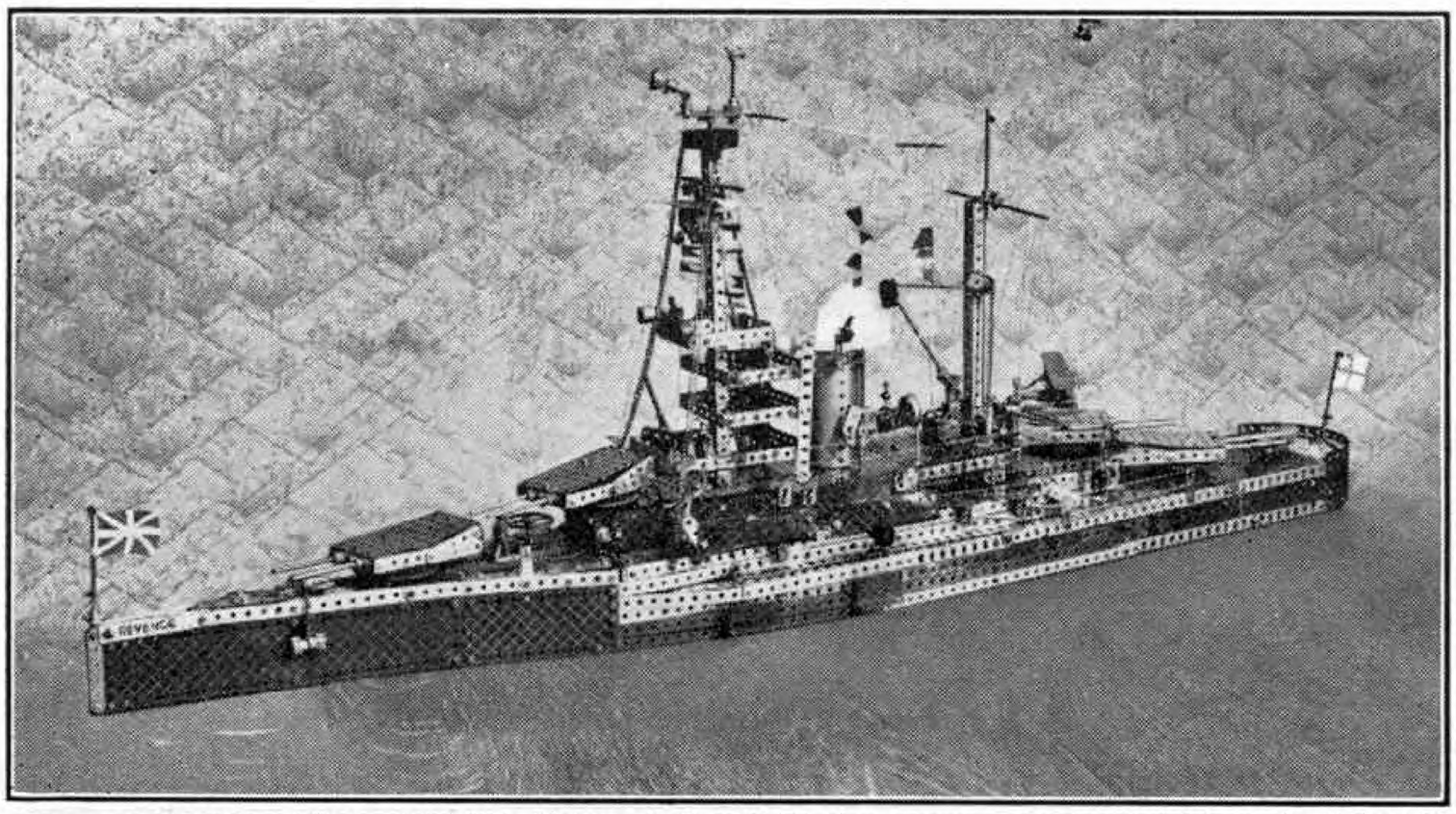
The closing date for entries is 31st July, but to avoid disappointment due to possible delays in delivery, entries should be posted as soon as they are ready and not kept until the closing date approaches.



Tanks make good subjects for Meccano models. The example shown above was built by P. Robinson, Leicester.



D. J. Hall, Winchester, won a prize in a recent "M.M." Contest for this model of a Westland "Lysander" army co-operation aeroplane.



A fine model of H.M.S. "Revenge" built in Meccano by S. Hall, Bingley, who was awarded First Prize in the "Winter" Model-Building Competition.

"Home Gadgets" Model-Building Competition

We are taking this opportunity of reminding readers that the *"Home Gadgets"* Model-Building Competition is still open for entries. The first announcement of this Contest appeared in the March issue of the *"M.M.,"* and the essential details are repeated here for the benefit of readers who did not see that issue and would like to send in an entry. The Contest is open for models of any kind of gadget built from Meccano parts that can be put to practical use in the home. Book and tool racks, shelf brackets and wool-winders are examples of the kind of models that are suitable for entry.

The competition closes on 31st May, so that intending competitors should not delay in preparing and submitting their entries.

The following prizes will be awarded for the most practical and ingenious gadgets submitted. First, Cheque for £3/3/–; Second, Meccano or Hornby products value £2/2/–; Third, products value £1/1/–. There will be also five prizes of products value 10/6 and five of products value 5/–.

Model-Building Competition Results

By "Spanner"

"Winter" General Contest

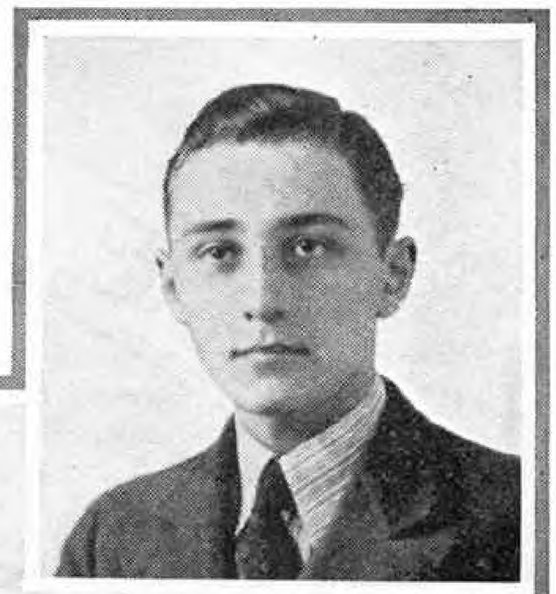
The complete lists of prize-winners in Sections A and B of the *"Winter"* Model-Building Competition, which was announced in the December 1939 issue of the *"M.M.,"* are as follows:

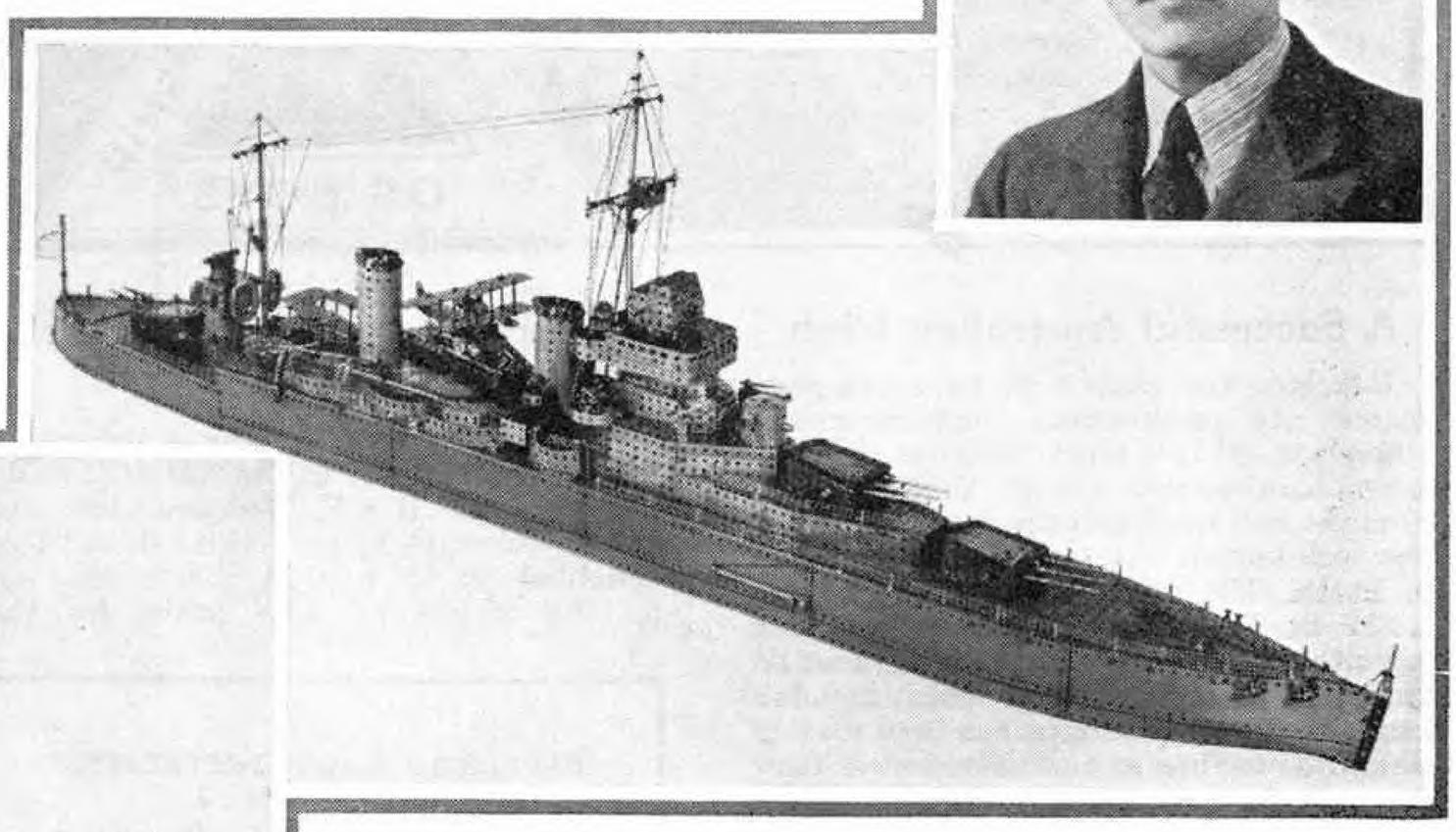
Section A (Competitors 14 years of age and over).
1st Prize, Cheque for £3/3/–: P. Giese, Buenos Aires; 2nd, Meccano or Hornby products value £2/2/–: L. W. Chitty, Kingston; 3rd, products value £1/1/–: J. Matthews, Fillongley.

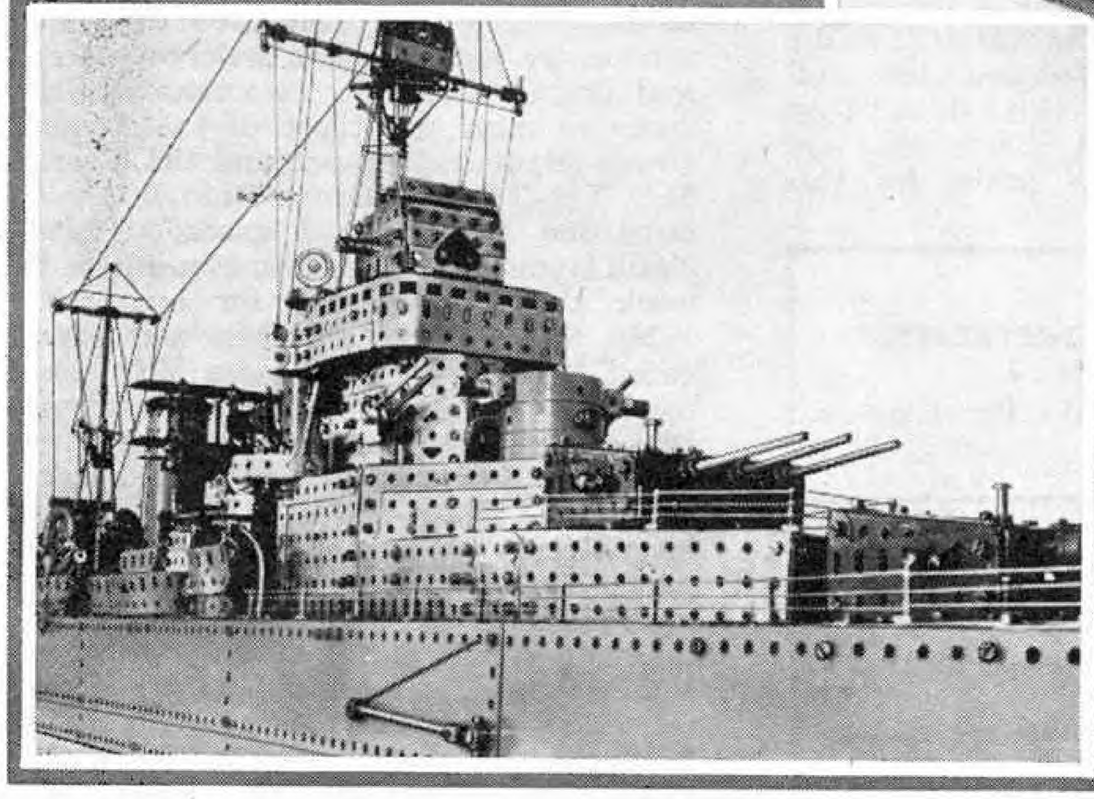
Products value 10/6: W. Perry, Bloxwich; P. Henriksen, Natal; S. Whiteside, Clitheroe; P. Wickham, Leicester; E. Clements, Orpington.

Products value 5/–: J. Ancall, Christchurch, N. Zealand; L. Crosland, Huddersfield; G. Hamilton, Vancouver; J. Mathews, Exeter; A. Drummond, Halifax.

Section B (Competitors under 14 years of age).
1st Prize, cheque for £3/3/–: S. Hall, Bingley; 2nd, Meccano or Hornby products value £2/2/–: M. Gainsborough-Waring, London W.2; 3rd, products value £1/1/–: K. Chettleburgh, Leicester.







Pablo Giese, Buenos Aires, and his fine model of the Argentine cruiser "La Argentina." The illustration on the left shows a close-up view of the ship's superstructure.

Products value 10/6: D. Elliott, Loughton; M. Holden, Cheltenham; E. Friis, Johannesburg; M. Willoughby, St. Leonards-on-Sea; D. Frankish, Boston.

Products value 5/–: R. Nicholas, Orlando, Transvaal; B. Hambly, Bexhill-on-Sea; E. Simmons, Brighton; R. Middleton, Hull; D. Rigg, Port Elizabeth.

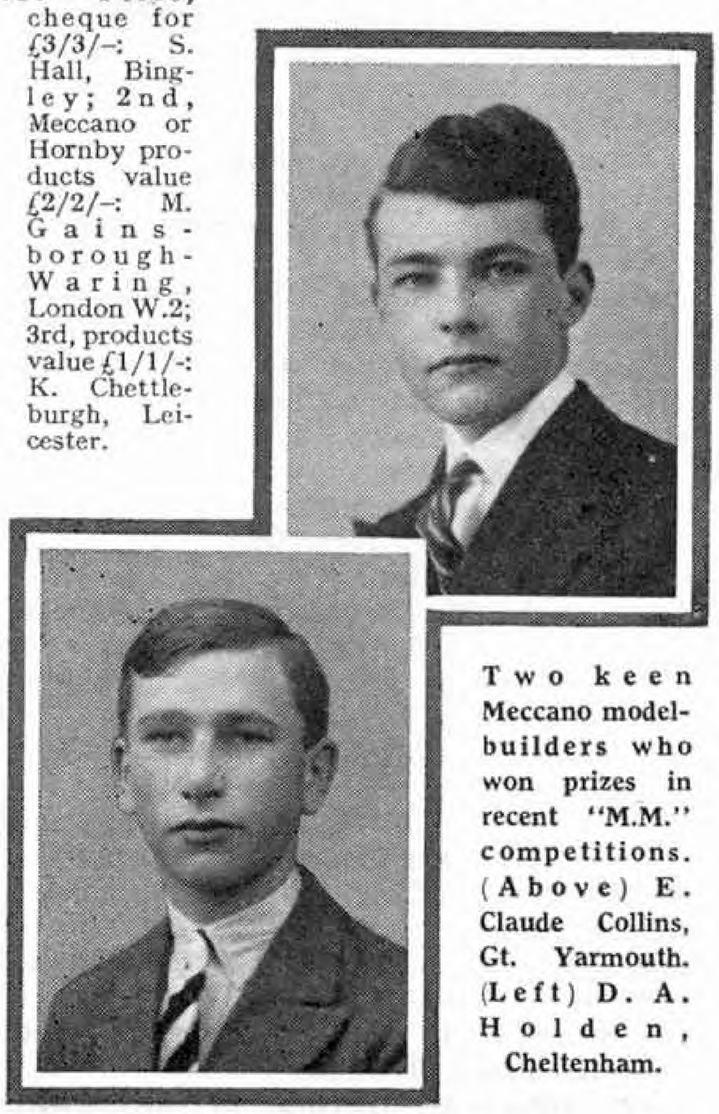
One of the most pleasing features of this competition was the great variety of subjects represented among the prize-winning models. In both sections competitors submitted a bewildering array of very fine models, and the standard of workmanship was excellent. The First Prize in Section A was awarded to P. Giese, a competitor from far off Argentina, in recognition of his splendid work in building a beautifully proportioned model of an Argentine Navy cruiser *"La Argentina,"* which was constructed in a British shipyard and launched in March 1938. The model is shown above and I think it is one of the most realistic model warships that I have seen. Giese has won several prizes in Meccano competitions and each model he submits shows improvements on his previous efforts.

The model of *"La Argentina"* is about 7 ft. long and its hull is constructed mainly from Strip Plates secured to a framework of Angle Girders and Strips. Particularly good work has been done in the shaping and equipment of the main control tower, the details of which can be seen from the illustrations. Each of the two funnels is formed from two Boilers overlapped, and they are fitted with realistic cowlings consisting of a ring of strips held in place by Obtuse Angle Brackets.

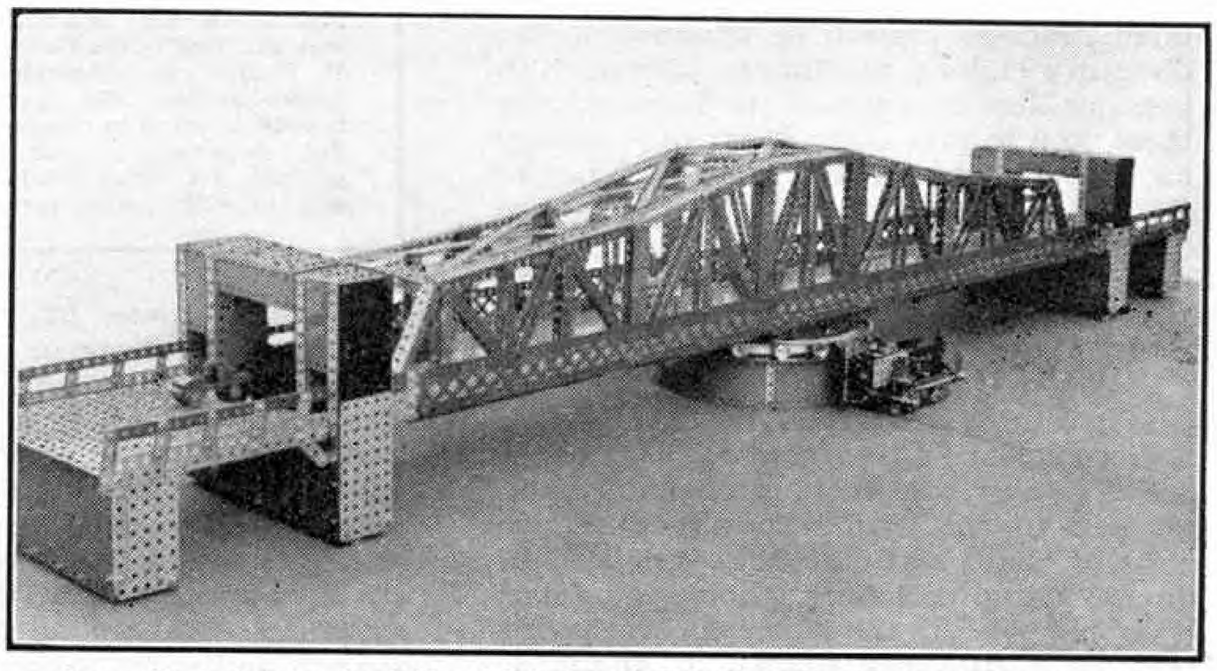
The triple gun turrets are formed from Angle Girders, Flat Girders and Strip Plates, and they are carried on a Circular Plate mounted so that it can be rotated.

The model carries two miniature aircraft modelled on the "Walrus" observation amphibian, and these are very neatly built up. One of the craft is mounted on a launching catapult and the other is accommodated in the deck space between the funnel and the rear mast, the wings being folded so that the aircraft takes up as little room as possible.

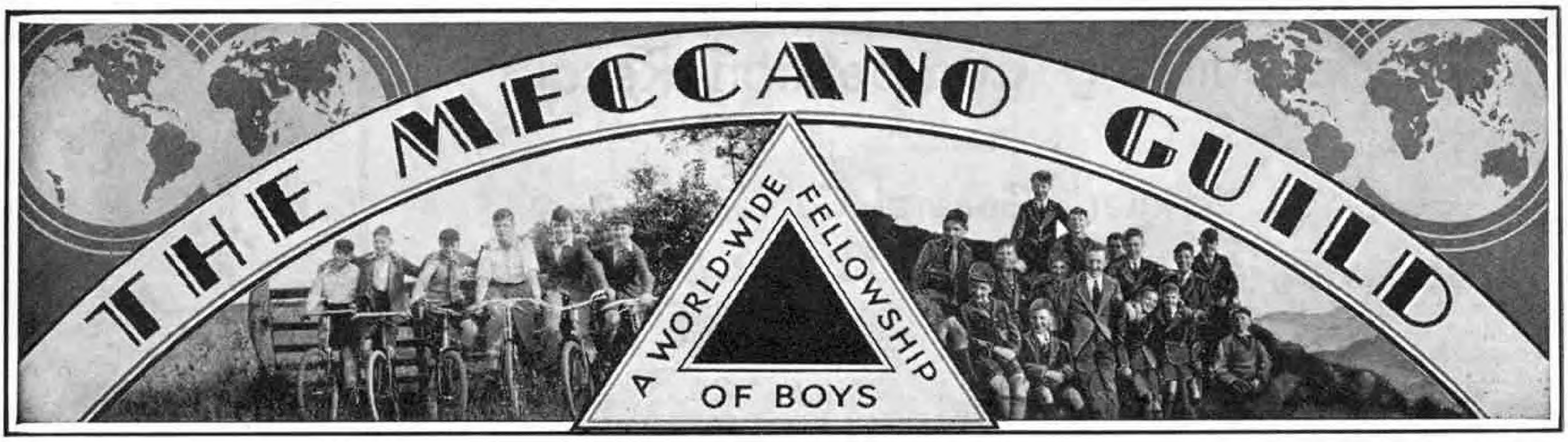
A naval ship was also the subject of the model that won First Prize in Section B. This was a model of H.M.S. *"Revenge,"* built by S. Hall, and it is illustrated on page 244 of this issue.



Two keen Meccano model-builders who won prizes in recent "M.M." competitions. (Above) E. Claude Collins, Gt. Yarmouth. (Left) D. A. Holden, Cheltenham.



A soundly designed swing bridge 7 ft. in length. It is the work of L. W. Chitty, Kingston.



A Successful Australian Club

If a Meccano Club is to be a complete success its programme must never be allowed to get into a rut. This has been the key-note of the policy of Mr. V. Malmgreen, Founder and Leader of the Maylands M.C., the well-known Western Australian club in Perth. The club was affiliated to the Guild in February 1936, and has just recruited its 100th member. Throughout its existence the scheme under which the club has carried out operations has been revised from time to time so as to avoid monotony and to stimulate interest. Special efforts have been made to achieve the widest publicity by such means as the organisation of Exhibitions on a large scale. These efforts have been followed by periods in which intensified club work, both model-building and train operation, has been the order of the day. The competitive spirit has been encouraged by the division of the club into three Factions, which encounter each other in games and Model-Building Contests.

Now the Maylands club has entered upon a new phase, which has brought with it a wonderful increase in enthusiasm and high spirits. All clubs are faced at times with the difficulties that follow when older members leave, generally because of removals and the necessity for taking up careers, and in the Maylands club this has been met by a recruiting campaign among younger boys. Mr. Malmgreen tells me that some of the newcomers, whose ages range from nine to eleven years, are very small, but that they make up for their lack of size by their enthusiasm, with which they seem to have infected the entire club. In guiding and directing them Mr. Malmgreen has the assistance of a former member of the club, who has taken up the work with as great an interest as the Leader himself, and the combination of new blood and experience has added zest to club meetings.

Here is an example for all clubs to keep in mind. Success cannot be attained if the doors of a club are not thrown wide open to younger Meccano enthusiasts. To encourage these, and to give them every opportunity for enjoying their hobby, is to act in the true spirit of the Guild and also to ensure continued success for the club itself. The recruits of to-day, however small they are, are the experienced members of to-morrow.

Correspondents Wanted

Interest in the Guild and H.R.C. Correspondence Clubs continues to be as active as ever, and there is a keen demand for pen friends with whom to exchange news of Guild and club activities, and to discuss stamp collecting, photography and other hobbies. At the moment correspondents are particularly wanted in Australia, Canada and New Zealand.

Meccano Clubs and the "M.M." Radio Fund

On page 263 of this issue is the second list of subscriptions to the "*M.M.*" Radio Fund for the R.A.F. Meccano clubs and H.R.C. Branches figure in this list, and I am delighted to learn that others also are making efforts to raise funds for this excellent purpose by means of special concerts, exhibitions or regular collections. I should like to see both the Guild and the H.R.C. taking an even more prominent part in the scheme, however, and urge the officials of all clubs and Branches who have not yet made a decision to follow the fine examples set by those whose names have already appeared in the lists of subscriptions. We are all interested in our airmen, and eager to do something to help them. Here is a splendid opportunity.

Meccano Club Secretaries

No. 54. W. Peterson



W. Peterson, secretary of the Maylands (Western Australia) M.C., Leader Mr. V. Malmgreen. This successful Australian club was affiliated to the Guild in February 1936. It follows an admirable programme of model-building and games, and special interest is taken in competitions of all kinds. For this purpose the club is divided into three sections, for which model-building contests and games tournaments are arranged regularly.

A Welcome for Evacuees

Clubs and Branches of the H.R.C. in various parts of the country are sparing no effort to help boys evacuated from large centres by making them welcome at club and Branch meetings. Two examples that come to mind are those of the Twyford Grove (Banbury) Branch and the Hornsea M.C. The Twyford Grove Branch is not a large one, but it has a splendid Hornby Train layout and on certain evenings in the week this is available for evacuees.

Mr. Shooter, the energetic and experienced Leader of the Hornsea M.C., sends me a glowing report of the excellent work that has been done in introducing the Evacuees M.C. that he has formed to the delights of model-building, Hornby Train operations, lantern lectures, cinema displays and games enjoyed by his own members. For most of the members of this interesting club these activities constitute a new world. All of them are making splendid headway and showing the utmost keenness.

Every member of the Guild will join with me in expressing his hearty appreciation of the work that these clubs and Branches are doing.

Proposed Clubs

Attempts are being made to establish Meccano clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below.

ABINGDON—C. Cullen, "Waverley," Park Crescent, Abingdon, Berks.

CEYLON—Mr. S. L. Abeysingha, "Simpson Villa," Udahamulla, Nugegoda, Colombo, Ceylon.

DYSERTH—V. Morris, Moss Bank, Cwm Road, Dyserth, Flints.

GLASGOW—D. Brown, 112, Stamperland Gardens, Clarkston, Glasgow.

HINCKLEY—S. Oakes, 4, Coventry Road, Wolvey, Hinckley.

INDIA—S. Vaidynathan, Room No. 38, Clive's Hostel, Teppakulaw P.O., Trichinopoly, India.

JERSEY—I. M. Rive, Roseland House, Bulwarks, St. Aubins.

LONDON—M. J. Franklin, 20, Staverton Road, London N.W.2.

PRESTON—R. Huntington, Farington Vicarage, Preston.

RINGWOOD—K. C. Cutler, 40, Seymour Road, Poulner, Ringwood, Hants.

SOUTHPORT—P. Lisle, 3a, Cambridge Road, Southport.

TORQUAY—G. A. V. Fawcett, "Rosea," Marldon Road, Shiphay, Torquay.

TORQUAY—G. P. Crabbe, "Corston," Vansittart Road, Torquay.

TOTTERIDGE—M. Hotton, 37, Greenway, Totteridge.



Redruth County School M.C.—Members have been grouped in two sections for model-building. The Leader of each group selects a model suggested by members, and this is then constructed. One group has built a funicular railway and the other an Army lorry and trailer. Other Model-building Evenings have been spent in fitting up various kinds of drives making use of Worms and Helical Gears. A cinematograph show has been given. A small admission fee was charged, the proceeds being devoted to the purchase of new material. An illustrated Magazine is circulated among members. Club roll: 14. *Secretary:* T. J. Anderson, 6, Carlyon Road, Truro, Cornwall.

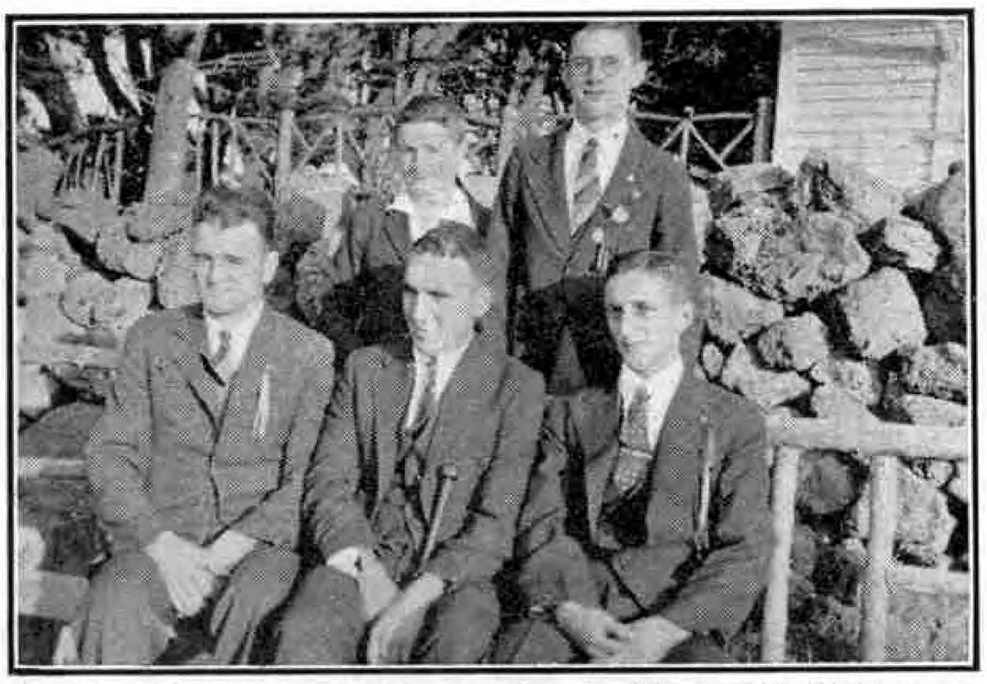
Coloured Mission (Cardiff) M.C.—The club's third birthday party was very successful. Refreshments were kindly provided by Mrs. T. H. Binstead. Bad weather has limited attendances, but interest in model-building continues, and preparations for the annual exhibition produced some interesting models. Club roll: 15. *Secretary:* D. H. Binstead, 37, Penhill Road, Cardiff.

Saffron Walden M.C.—Meetings have now recommenced. The Hornby Railway layout that was formerly in operation has been dismantled and a more extensive one is being introduced. It is hoped that it will be made available for electrical operation. The stock of Meccano parts also is being increased, and excellent model-building is being carried on. Members are delighted at the resumption of activities, and the amount of fun, work and play enjoyed by them is steadily increasing. Club roll: 20. *Secretary:* David A. Rees, Friends School, Saffron Walden, Essex.

St. Oswalds (Thornton Heath) M.C.—At one meeting models of imaginary vehicles of the future were exhibited by members. Some of these were fantastic, but all had features of special interest. A Talk was given by Mr. Chapman on *"London's Underground,"* when interesting old maps and tickets were exhibited. Two-minute Talks also have been given by members on subjects drawn from a hat, the topics including aircraft, the blackout, evacuation and football. Club roll: 25. *Secretary:* J. F. Jaques, El Molino, 5, Ingram Road, Thornton Heath, Surrey.

Gt. Baddow M.C.—There has been great model-building activity, the programme including also a blind-fold model-building contest. Several large models also have been built by members. A series of particularly successful meetings have been held recently, one being devoted to a Table Tennis Tournament. An attractive item was a contest in which members were limited to the use of certain Meccano parts. A senior member gave an interesting Talk on *"The War in the Air,"* and at one meeting each member spoke on a selected subject for from 2 min. to 5 min. A full rehearsal has been held for the club's concert. Club roll: 20. *Secretary:* R. Willis, "Ivydene," Malden Road, Great Baddow.

Purley County School M.C.—The programme to be followed was discussed by members at a special meeting. Model-building has been continued, with excellent results. Competitions are greatly enjoyed by members. Several meetings have been devoted to games. Club roll: 8. *Secretary:* D. Hardwick, Woodcroft, Beech Drive, Kingswood, Surrey.



Our illustration this month shows a group of officials of the Christchurch and Ashburton Meccano clubs, two neighbouring New Zealand clubs that exchange visits, arrange joint excursions and organise inter-club model-building competitions. The Christchurch M.C., Leader Mr. J. Ancall, was affiliated in May 1930, and the Ashburton M.C., Joint Leaders Messrs. E. Furby and E. Osborne, in January 1931.

Hornsea M.C.—Great activity continues, each section holding many interesting meetings for Games, Talks and Hornby Railway operations, in addition to Model-Building Evenings. The Science Section has had Talks on *"Great Chemists"* and *"The Transmission of Heat."* Other Talks given to various sections have been on *"Alaska," "A Trip to York," "Life on a Ship"* and *"Hornby Trains."* Some of these Talks were given with the aid of a microphone. Cinematograph Displays continue to arouse great interest, and meetings have been devoted to Games. Hornby Train Nights also have been held. Club roll: 20. *Secretary:* P. Richardson, "Summerleigh," Esplanade, N., Hornsea.

Exeter M.C.—The most exciting recent events have been the successes of two of the club's football teams in the competition for the Hodder cup. As the two reached the final the winning of the Trophy is regarded as a club triumph. Indoor competitions also are being carried on, Corinthian football and draughts being favourites, and Meccano model-building also continues. One member has made a particularly fine model of the French battleship *"Dunkerque."* Club roll: 80. *Secretary:* M. F. R. Golesworthy, 122, Old Tiverton Road, Exeter.

Pettits Lane School (Romford) M.C.—Meetings are again in full swing, and new members have been enrolled. An exhibition of Meccano models is in prospect, and members have already begun to construct models for display. A special feature is made of radio construction, to which several meetings have been devoted. Visits from former members who have left the school have been greatly appreciated. It has been decided that the proceeds of the club's Exhibition shall be devoted to the *"M.M."* Radio Fund for the R.A.F. Club roll: 22. *Secretary:* K. Powell, Pettits Senior Boys School, Romford, Essex.

AUSTRALIA

Maylands M.C.—Many new members have been recruited and Model-building has been pursued with great interest and enjoyment, in spite of temperatures of more than 100 deg. F. Mr. J. Knight, a former member of the club, has kindly volunteered to assist Mr. Malmgreen, Leader of the club, and his help and advice is greatly appreciated, especially by the younger model-builders. The keenness of members shows itself in their pleasure when they set their models in operation, and see them work efficiently. At one recent Factions Exhibition the Green-and-Gold exhibit was an aircraft factory, the Blue-and-Gold display represented the production of tin, and bridge-building was the subject of the exhibit prepared by the Red-and-Blue Faction. All displays included excellent working models, and the prize was awarded to the Green-and-Gold Faction. Club roll: 100. *Secretary:* W. E. Peterson, 1, Warne Street, Maylands, Perth, Western Australia.

SOUTH AFRICA

Malvern M.C.—The most outstanding recent event was the "Century Fair" on behalf of charities. This was opened by Mr. J. J. Page, Mayor of Johannesburg, and a large sum was realised. The Fair was the result of renewed enthusiasm on the part of members, all of whom worked splendidly with model-building and other preparations necessary. The Rambling and Dramatic Sections have continued their activities. Debates also have been held, and attractive Model-Building Contests have been arranged for both Junior and Senior Sections. An especially enjoyable event was the Christmas party, at which the Club's Dramatic Section presented a pantomime. The usual party at the Epworth Home could not be held on account of an outbreak of measles, but later members visited the Home and distributed gifts. Club roll: 35. *Secretary:* D. Hean, P.O. Box 8, Cleveland, Johannesburg, South Africa.

With the Model-Builders

Fittings for Fighting Ships

Judging from the letters I receive, the most popular subjects for models just now are fighting ships. I have been asked on many recent occasions for advice on building various parts of the equipment of such vessels, and the most suitable Meccano parts to use for the purpose. I feel sure that model-builders generally will be glad of some guidance on these points, and will find the following hints helpful.

In warship models the armament and other military equipment is of primary importance. The heavy guns with their turrets can be constructed easily from Flexible Plates, Strips and Axle Rods. A small quick-firing gun may be built from a short Axle Rod fitted to a stand composed of a Coupling that is free to swivel. A gun shield consisting of a Flat Trunnion can be placed in front of the Coupling. Anti-aircraft guns may consist of Rods mounted in Couplings, which are supported in a framework free to swivel in a vertical plane.

Lifeboats and their accompanying launching gear are other important deck features. Strips or Flexible Plates suitably bent may be used for constructing the boats, while the davits may be either Curved Strips or lengths of heavy Copper Wire bent to shape. The lifeboats can be suspended from them by short lengths of Cord. The Meccano $\frac{5}{8}$" Rubber Ring, part No. 155, is very useful for representing life-belts. The Rubber Ring should be bound with Meccano Cord, and then bears a close resemblance to the actual article.

From these suggestions it will be seen that the construction of model warship fittings in Meccano presents great possibilities, and I shall be interested to hear from readers who have devised other novel uses for the parts in this connection.

Magnetic Screwdriver

In the building of intricate models it is often necessary to insert bolts in almost inaccessible positions. In some cases a magnetic screwdriver is useful, and it is easy to form such a tool. It is only necessary to wind some fine cotton covered wire on a bobbin, and then to place the bobbin on the shaft of an ordinary screwdriver. The bobbin may be made from cardboard and a paper core, but it is best to use the Meccano Bobbin, part No. 181, which has the advantage that it can be slipped on and off the blade of the screwdriver. It is not always necessary to keep the magnetising current on, for the screwdriver blade is of hard steel and the magnetic properties will be retained for a considerable time.

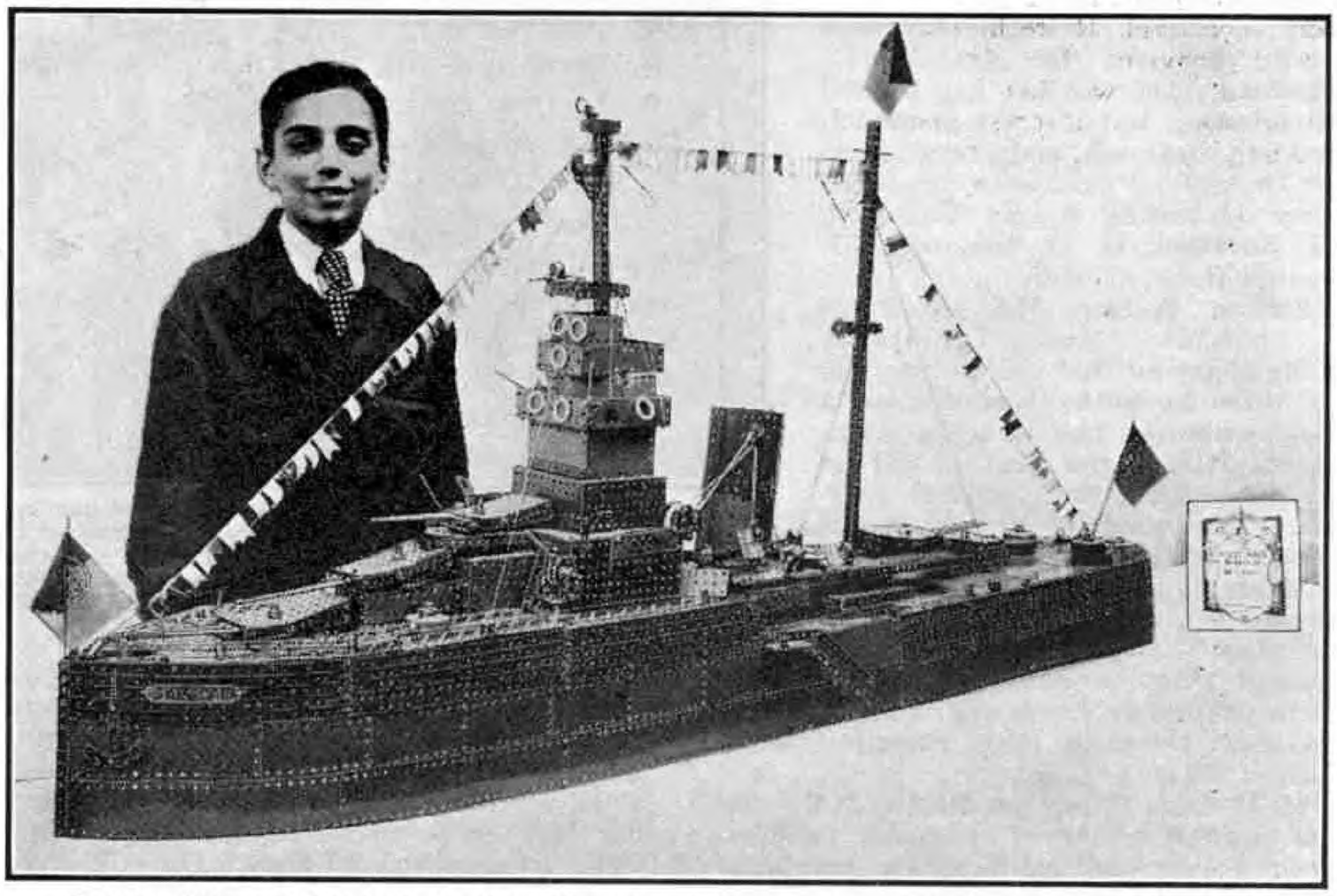
Alternatively a screwdriver may be magnetised by stroking it with a horseshoe or a bar magnet. It is immaterial which pole of the magnet is used, providing the screwdriver is stroked always in the same direction with that pole; it may be stroked with the other pole in the opposite direction.

Attaching Cord to Meccano Rods

Anchoring the hoisting cord of a Meccano crane neatly and efficiently to the Crank Handle or winding shaft appears to be a source of difficulty to young model-builders, who find that the loop made on the end of the cord slips on the smooth axle. The proper way to tackle the problem is to make use of the Cord Anchoring Spring, Part No. 176, which is designed specially to overcome the difficulty.

This device consists essentially of a small coil spring, one end of which is formed into a loop to which the end of the hoist cord can be attached. The other end of the coil is ground to a knife-edge so that it bites into the axle and provides a rigid anchoring point. To use one of these Springs, the part should be placed over the end of the hoist shaft and twisted in an anti-clockwise direction as though the Rod were threaded, and at the same time should be pushed along the shaft into the required position. It will be found impossible to push the Spring directly into position unless it is twisted simultaneously, and no attempt should be made to do this.

After the Spring has been screwed into position the hoist cord should be attached to the loop, and it will then be found impossible to cause the Spring to slip round on the Rod when a pull is exerted in a clockwise direction. The greater the force applied, the greater is the grip of the Spring on the Rod.



G. Nobre, Lisbon, Portugal, who is a keen Meccano enthusiast, photographed with an example of his work.

The Cord Anchoring Spring is only about $\frac{1}{4}$" long, and therefore it provides a very neat and efficient method of securing Cord to a Rod.

Non-Slip Belt Drives

When using a cord or string belt drive between pulleys in Meccano models the string often becomes slack and tends to slip round the Pulleys. A simple remedy for this is suggested by K. Stevens, Newcastle. He connects the ends of the string by means of a small piece of elastic or Spring Cord, which keeps the string always taut. This is quite a good plan, but of course for drives where greater power is required the ideal method is to replace the string driving band entirely by Spring Cord or a Driving Band. These Driving Bands are available in various lengths suitable for all drives normally required.

The Meccano Worm (Part No. 32) and Its Uses

M. Smith, Birmingham, is keenly interested in the assembly of gear mechanisms, and is in doubt regarding the various ratios that are obtainable by using the Worm, Part No. 32, in conjunction with Meccano spur wheels and Pinions. I am therefore replying to his letter here for the benefit of other model-builders who may wish for information on this matter.

Each revolution of a Worm results in the Gear with which it meshes moving through a distance equal to one of its teeth. Hence the number of revolutions that must be made by a Worm in order to complete one revolution of the Gear Wheel or Pinion it drives can be ascertained by counting the teeth on the driven wheel. Examples of the ratios obtainable by using a Worm in mesh with other Meccano Gears and Pinions are as follows: ratio 25 : 1, Worm meshed with a $\frac{3}{4}$" Pinion or $\frac{3}{4}$" Contrate; 19 : 1, Worm and $\frac{1}{2}$" Pinion; 50 : 1, Worm and 50-teeth Gear; 95 : 1, Worm and $2\frac{1}{2}$" Gear. Larger reduction ratios such as 112 : 1 and 133 : 1 can be obtained with a Worm and a built-up wheel of Rack Segments and a Worm meshed with a $3\frac{1}{2}$" Gear respectively.

These examples by no means exhaust the range of ratios obtainable with standard Meccano Gears. In addition, it is possible to use the Worm in conjunction with the pinions from the driving shaft of the No. 1 and No. 2 Clockwork Motors and the E1 Electric Motor. When used with a No. 1 or No. 2 Clockwork Motor pinion a Worm gives a ratio of 13 : 1 and 12 : 1 respectively. A combination of a Worm and the pinion of an E1 Motor provides a ratio of 10 : 1.

The Meccano Worm has a pitch of 12 threads to the inch to enable it to mesh properly with the various Meccano gears. It is extremely useful for speed reduction purposes, although it should be remembered that it absorbs a good deal of power owing to friction created by the thrust that is produced through the tendency of the Worm to move longitudinally instead of turning the gear with which it is meshed. A worm drive, therefore, should always be kept well lubricated.

Owing to the fineness of the pitch the Worm is irreversible.

Competition Corner

ADVERTISING SLOGAN CONTEST

Every reader of the "*M.M.*" is interested in advertising slogans, and this month we propose to make use of a selection of these in an easy and interesting competition. This will provide a splendid opportunity, for all must be familiar with slogans of this kind, which they read on the hoardings, and in newspapers and periodicals, and often hear quoted. In many slogans the name of the product or service advertised does not actually appear, but the association has become inevitable through constant use.

In the panel in the centre of this page is a list of 30 advertising slogans from which essential words have been omitted. The names of products associated with the slogans also are missing. In our contest we ask readers to complete the slogans, and to state in each case the product whose virtues or merits it describes. Some of the slogans will be recognised very quickly, and there will be no difficulty in giving the information that is asked for. This applies particularly to old and well-established catch words or phrases. Others will be found a little more difficult, but readers who keep their eyes open will have little trouble in identifying them.

1. **Puts — into you.**
2. **The smooth block —.**
3. **The — — breakfast.**
4. **Safety —.**
5. **— — — made engineering —.**
6. **Spreads — —.**
7. **— wisely buy —.**
8. **The — sports car.**
9. **Don't — it; — it.**
10. **For extra —.**
11. **If it's — then it's —.**
12. **Say —.**
13. **Builds up a —.**
14. **— as a fiddle on —.**
15. **— make it; it makes —.**
16. **For your — sake.**
17. **The perfect —.**
18. **First and still — —.**
19. **Fluid —.**
20. **Mary had a little — with — of — —.**
21. **Friday — is — —.**
22. **Your — Sir.**
23. **Get the — habit.**
24. **Out of the — came the — wash.**
25. **Rent your —.**
26. **Keep that — complexion.**
27. **— Please.**
28. **Did you — your — to-day?**
29. **Biggest little — in London.**
30. **The perfect table —.**

When as many slogans as possible have been dealt with in this manner a list should be prepared in the order given in the panel. The list should be written out on a postcard and forwarded to "*Advertising Slogans*, Meccano Magazine, Binns Road, Liverpool 13."

Prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– to be chosen by the winners from our current catalogues and price lists, will be awarded to the senders of the four best solutions in order of merit. In the event of a tie for any or all of the prizes the judges will take into account the neatness or novelty of the entries concerned. Entries must reach this office not later than 31st May.

There will be a separate section of this contest for the readers living overseas, that is outside Great Britain and Northern Ireland, Eire and the Channel Islands, are eligible. The prizes in this section will consist of Meccano products to the same value as those in the Home section. Overseas entries must be despatched in time to arrive not later than 31st August.

May Photographic Contest

This month we announce the second of our series of photographic competitions for 1940, which we shall continue throughout the summer. The conditions ruling in this contest are very simple. Competitors are asked simply to submit photographs in each contest, and the prizes will be awarded to the best sent in. Entries may be outdoor scenes, or examples of indoor photography, but in each case an appropriate title must be written on the back of each. An entry may consist of more than one photograph, but no competitor can be awarded more than one prize in any one monthly contest.

War conditions have brought certain restrictions on outdoor photography. These apply to military, naval and Air Force subjects, and readers should take care to avoid photographing such things as docks, barracks, aerodromes and troops on the march. Intending competitors are urged to read the article on page 200 of the April issue, which will form a useful guide.

Each month's entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. In each section prizes of Meccano products or photographic material to the value of 21/– and 10/6 respectively will be awarded. There will be two similar sections with prizes of the same value for Overseas readers.

Entries in this month's competition should be addressed "May Photo Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home section is 31st May and that in the Overseas section is 31st August.

Competition Closing Dates

HOME	
May Advertising Slogans ...	... 31st May
May Photographic Contest	... 31st May
OVERSEAS	
Missing Words Contest ...	... 31st May
February Drawing Contest...	... 31st May
March Crossword Puzzle Contest	... 29th June
March Drawing Contest ...	... 29th June
April Hidden Titles Contest	... 31st July
April Photographic Contest	... 31st July
May Advertising Slogans ...	... 31st August
May Photographic Contest	... 31st August

COMPETITION RESULTS

HOME

"March Crossword Puzzle."—1. T. Hill, Bolton. 2. J. Hold, Barnsley. 3. A. J. B. Lilley, Thornton Heath. 4. Rose A. Strickland, Birmingham.

"March Drawing Contest."—First Prizes: Section A, A. Elvey, London S.E.9; Section B, J. Matthews, Aylesbeare Common. Second Prizes: Section A, E. Oldham, Hyde; Section B, J. A. Pauley, Cambridge. Consolation Prizes: P. X. Breathnach, Dublin; W. Grewcock, Birmingham; A. Holland, Romford; G. D. G. Pursey, Southampton; E. Rydeheard, Blackpool.

OVERSEAS

"December Drawing Contest."—First Prizes: Section A, R. J. Dickison, Dunedin, N.Z.; Section B, R. Hunter, Capetown, S.A. Second Prizes: Section A, T. A. Wade, Johannesburg, S.A.; Section B, R. A. Williams, North Island, N.Z.

"December Jig-Saw Advertisement Contest."—1. H. C. Morgan, Nova Scotia, Canada. 2. B. P. Julian, Wellington, N.Z. 3. B. Salvidge, New Westminster, Canada. 4. H. T. King, Victoria, Australia. Consolation Prizes: W. C. Coles, Cheltenham, South Australia; G. Darper, Durban, S.A.; J. C. Fearne, Kospikwa, Malta.

"December Photographic Contest."—First Prizes: Section A, C. R. Anderson, Timaru, N.Z.; Section B, R. Thompson, Toronto. Second Prizes: Section A, T. Smith, Sydney. Section B, V. Jennings, Melbourne. Consolation Prizes: S. L. Abeysingha, Colombo; Mervyn de Silva, Kandy, Ceylon; Miss Nalinii A. Perera, Mawanella, Ceylon.

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STAMP COLLECTING

THE BIRTH OF THE POSTAGE STAMP

THE 100th anniversary of the introduction of the first adhesive postage stamps, Great Britain's "Penny Black" and "Twopenny Blue," will be celebrated on the 6th of this month. Almost every newspaper and magazine throughout the world is devoting columns or pages to the Centenary. Radio programmes are talking of the topic, and in the United States, President Roosevelt, a keen stamp collector himself, is to give a radio address as part of the celebrations arranged there.

In Britain the commemoration must be on a minor scale compared with the celebration originally planned, because of the war, but special stamps are to be issued, the Annual Congress is to be held in the Centenary week, and an exhibition is to be staged at the London Museum. Rightly it has been felt that some celebration should



A "Penny Black" used at Bath on 2nd May 1840, the earliest known date of use, sold in 1929 for £50 at Harmer's of Bond Street, to whom we are indebted for the stamp illustrations on this page.

be arranged, even in wartime, for the occasion is the centenary of an event that contributed more to promoting easy contact between peoples and nations than any other happening up to that time.

Before the birth of stamps, letter writing was a pastime in which ordinary people could not indulge. A letter consisting of a single sheet sent to Scotland from Liverpool cost 8d. to forward, and the rate was doubled if the letter were enclosed in an envelope. Letters from abroad cost far more. In 1830 a letter from the British West Indies, British North America, Malta or Gibraltar cost 2/1.

The story of the British Post Office dates back a long time before 1840. The word "Post" is derived from the Roman military "*posita.*" Roads of those early days were largely for military convenience, and stations, or posts, were established at intervals along the chief routes for the purpose of providing couriers with fresh horses. These couriers carried only State letters and the Posts were solely for the use of the Government.

In the 15th Century the Posts came into operation on a more public scale, the first being a horse-post between the Tyrol and Italy, set up in 1460. In 1533 there is a record of one Brian Tuke as Master of the Posts in Britain, and in a letter to Cardinal Wolsey's secretary he complains of "grete defaulte in conveyance of letters . . . and that the Kinges pleasure is, that postes be better appointed and laide in al places most expedient. . . . to make suche provision of horses, at al tymes . . . ." The reference is to slackness on the part of regular carriers of letters licensed to take passengers, goods and letters.

In modern days certain limits of weight are placed upon postal packets, but such things did not always exist. In the early 18th century we read of "Three Pounds of Tea, Two Bales of Stockings, a Box of Medicines, and one little Parcel of Lace" being conveyed by post to Mary of Modena, second wife of James II, then living at the Court of Lisbon. Stranger still was a parcel consisting of one "Doctor Crichton, carrying with him a cow, and divers other necessaries."

Gradually the postal service of modern times was taking shape, however, and Government control of the posts came into operation in Britain as far back as 1591. All letter carriers from that time were required to obtain a license and were subject to certain broad measures of supervision. A Penny Post was established by John Hill in 1659, but his work was far from being the success that attended the London Penny Post set up in 1680 by William Dockwra. The Government then had only one Post Office in London, and letters for the provinces or elsewhere in London had to be taken to this office for transmission. Dockwra set up some four or five hundred offices for the carrying of letters in the London area, and a great part of his business consisted of carrying letters to and from the G.P.O. in Lombard Street.

Dockwra's success was his downfall, however. He incurred the jealousy of persons of importance; proceedings were taken against him on the score of "infringement of the Crown's monopoly" and his service was abolished. Shortly afterwards the London Penny Post was re-inaugurated under official control and it thus continued until 1801, when the rate was doubled and the Penny Post became the Twopenny Post.

Dockwra's letters had been handstamped with a device indicating that the charges had been paid, and a reproduction of one of his stamps is shown on this page. The first printed frank, the forerunner of modern postal stationery, was conceived in Paris for de Villayer's local post service. This took the form of a wrapper bearing a printed device that had to be wrapped around the letter to indicate payment of dues. The modern form is more easily recognised in stamped covers issued in Sardinia in 1818 and in Sydney, New South Wales, in 1838, but it was left to Sir Rowland Hill, the British Postmaster-General of the day, to conceive and secure the adoption of the first adhesive stamp.



A mint pair of the "Twopenny Blue" sold for £36 in 1929 at Harmer's of Bond Street.

It is interesting to realise that Sweden almost claimed the honour of introducing the modern stamp. In 1823 a proposal was laid before the Swedish Parliament to secure the adoption of a "Postage Chart" within which letters could be placed. For use with letters too big for enclosure, the chart could be cut to preserve the stamped portion, which was to be affixed to the packet. Sweden rejected the scheme.

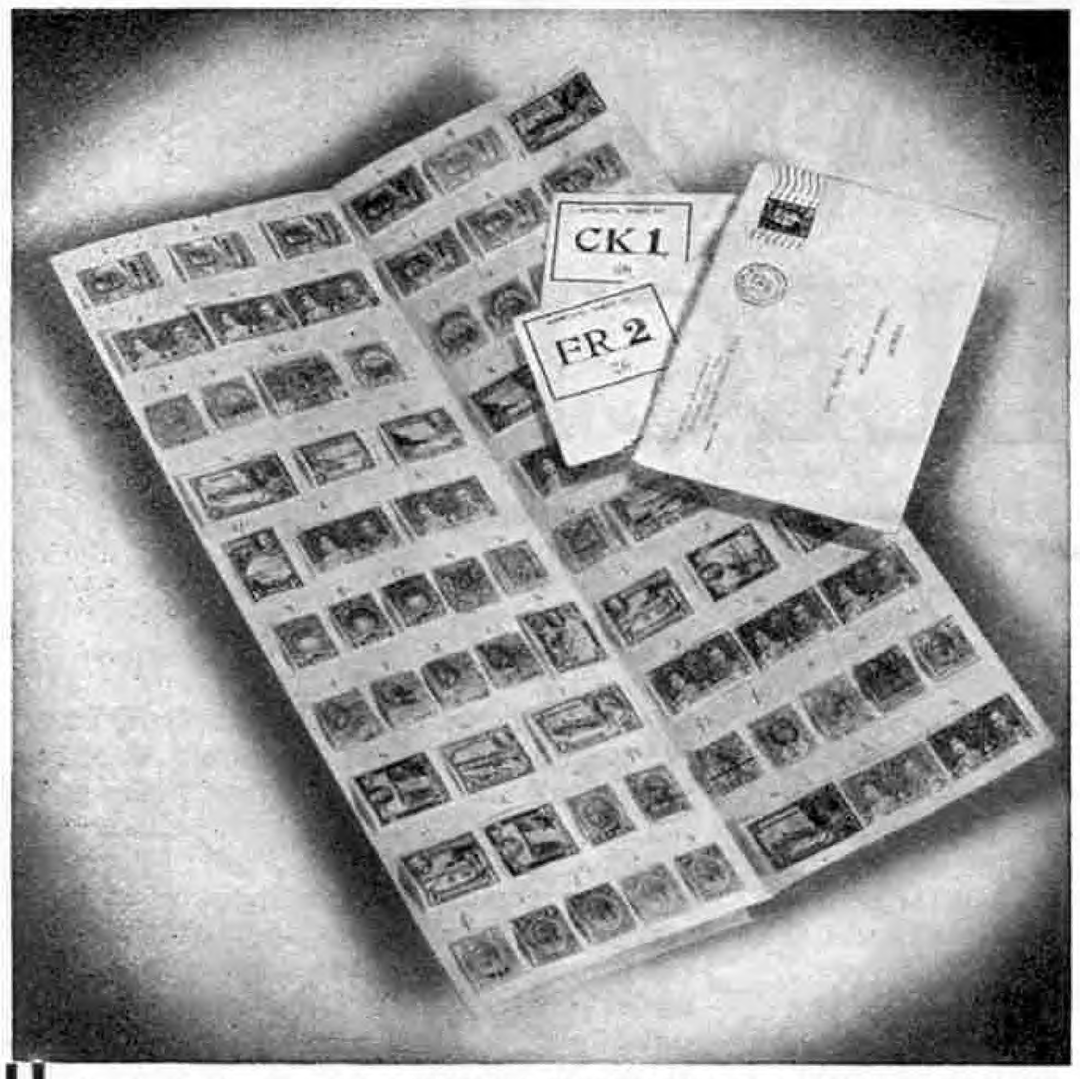
There is not space here to relate the swiftly moving events that preceded the arrival of the adhesive stamps. First there had to come uniform rates of postage for all parts of the country. Payment by distance was abolished, and uniform fourpenny postage was established on 5th December 1839. This was followed by uniform penny postage on 10th January, 1840, and the first appearance of the adhesive stamps themselves was on 1st May of that year. Although the stamps were not intended for use before 6th May, a number went through the posts earlier, and a cover bearing the date 2nd May, the earliest known, is illustrated on this page.



A beautiful mint strip of six "Penny Blacks" sold at the Bond Street Stamp Auctions for £34 in 1925.



A Dockwra "Penny Post" mark.



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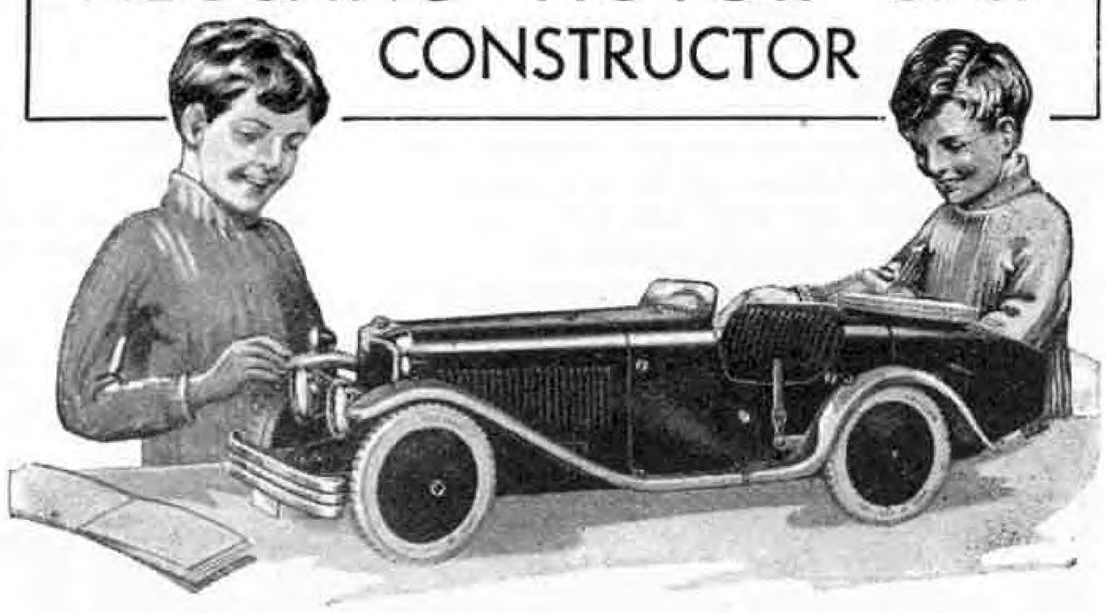
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New Collectors' Corner

Almost every stamp advertisement in the "*M.M.*" offers "approvals." These are those parts of a stamp dealer's stock that he is willing to send for collectors' inspection in the hope that they will buy some of the stamps. They are sent for collectors' approval, and hence their name.

Usually approvals have the stamps mounted on sheets or in books. They may have stamps of only one country on each sheet or several countries may be represented, and each stamp is priced separately. Sometimes complete sets are shown, the price for the set being slightly less than the combined prices of the individual stamps.



It will be seen that the real purpose of the approval sheet is to make it easy for collectors to buy just those stamps they need to build up their collections without the trouble of going to a dealer's shop and studying his stockbooks. The system is not confined to beginners' needs, and it works for advanced collectors also.

Free Gifts

Many dealers offer a free gift of stamps, or stamp collecting accessories, to collectors applying for approvals. Others offer gifts only to those who actually purchase stamps from the sheets, the value of the gifts increasing with the extent of the purchase.

It is not compulsory to purchase any of the stamps, although a free gift has been sent, but approvals should not be asked for if the idea is simply to obtain the free gift and not to buy any stamps. This practice is not common among "*M.M.*" readers, and indeed we have heard of their returning gifts when they have not been able to find any stamps they would like to buy from the accompanying approvals. In this position we should be inclined to return the sheets with a note explaining the matter, and asking for another series of sheets to be sent. Most dealers would regard such a course as very fair, and would send new sheets along.



How to Deal with Approvals

A collector who has asked for approval sheets should take care to keep the stamps clean and undamaged while they are in his possession, since they form the dealer's stock-in-trade. Choice should be made quickly, and the sheets returned without delay, certainly within not more than a fortnight. The exact price of the stamps chosen should be sent, and discount should not be deducted unless it is shown on the sheets. A letter or slip of paper should be enclosed stating the collector's name and address and the value of the stamps bought.

Stamp Gossip

and Notes on New Issues

Centenary Celebrations in London

In connection with the Stamp Centenary celebrations there will be an exhibition at the London Museum, Lancaster House, St. James, during the week commencing 6th May, the centenary date. Admission fees to the exhibition will be devoted to Red Cross Funds. The special attraction of the display will be part of the King's Stamp Collection. A Post Office will be opened in the building, and a special commemorative cancellation will be applied to all mail posted at that office.

The Editor of the "*M.M.*" has arranged for a number of covers bearing the Stamp Centenary commemorative stamps to be posted on his behalf. The covers will be given to readers who send the most interesting postcards expressing their opinion of the new stamps. Six covers will be awarded to readers in Britain, whose postcards must arrive not later than 31st May, and six will be reserved for Overseas readers, whose postcards must reach us by 31st August. Postcards must be addressed "*The Stamp Editor,*" Meccano Magazine, Binns Road, Liverpool 13.

The London celebrations also will include a great public dinner. It is learned that part of the proceedings at the centenary dinner will be broadcast, and this will include a speech by the Rt. Hon. W. S. Morrison, the Postmaster-General.

New Dutch Series

After 16 years the design of the general stamp issue of Holland is to be changed, and a new Queen's Head design, illustrated on this page, is to be introduced. The low values in the new series, from 5c. to 40c., have already appeared, and the higher values will be ready within the next few months. The 6c. and 27½c. values will not be included in the new series, and they disappear from the range as from 1st April last. Postcards with the new stamps impressed are issued.

The value illustrated is the 7½c. red. The other values now issued are as follows: 5c., dark green; 10c., violet; 12½c., dark blue; 15c., light blue; 20c., violet; 22½c., dark blue; 25c., dark red; 30c., brown; and 40c., light green.

An "American Celebrities" Stamp

We illustrate on this page a design from the "Famous Americans" series now being issued in the United States. The portrait is of Samuel L. Clemens, better known as Mark Twain, the famous humorous writer.

Details of this series were given in the "*Stamp Gossip*" pages of the April "*M.M.*" All the stamps in it are similar in general appearance to that shown in our illustration, but the framing varies.

Bulgarian Air Issue

The recently-issued Bulgarian air mail stamps are among the most attractive of recent days. There are 12 stamps in the series, each with a different design showing modern types of aircraft over various landscapes, or in symbolic settings.

We have chosen two of the most interesting for illustration here, the 6L., showing air mails being loaded at an aerodrome, and the 10L., which shows a symbolic association of an aeroplane, a locomotive and a mail tricycle.

Soldiers' Charities Issue

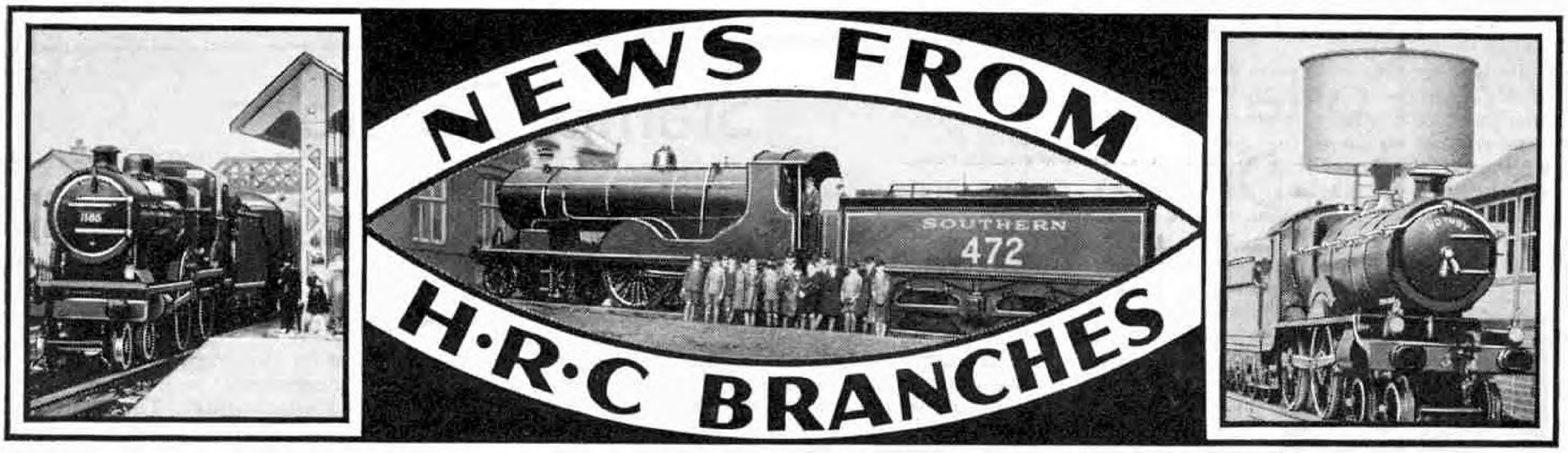
We illustrate on this page the two stamps issued in France in aid of Soldiers' Comfort Funds. The 40c. value depicts a soldier in the Maginot Line keeping watch. The 1f. value shows a veteran of the French Colonial Army, with a native village in the background.

Errors in Provisional Issues

Readers who secure copies of any provisional issues issued during war-time should keep a careful watch for errors and



varieties. So far two of these provisional issues have appeared, one in November in Newfoundland, and the other in the Sudan during April. In both instances important varieties have been found. In the Newfoundland issue, the overprinted word "CENTS" appears as "CENTL" on a number of the 4c. values, and in the Sudanese issue there are three cases where letters have been omitted in the Arabic characters of the overprint.



WHITECRAIGS—Meetings have been held regularly, except for interruption during the severe weather in February. The rolling stock has been overhauled by the Engineer, and everything is now in good order. The Branch resources are continually increased. Lectures have been given on *"British Locomotive Practice"* and other interesting topics. Various excursions of railway interest are being planned, and it has been decided to hold an Exhibition in order to add to club funds. Secretary: A. T. Henderson, "Studley," Freemain Road, Whitecraigs.

WALLINGTON—Evacuation and other wartime conditions have made meetings difficult. Members have been kept in touch with each other by means of the Branch Magazine, and meetings have now been resumed. Branch track and rolling stock has been overhauled, and timetable operations are now carried on. Secretary: B. F. B. Tatford, 20, Ingleby Way, Wallington, Surrey.

BASSETS SCHOOL (SEVENOAKS)—Track meetings have been held weekly and at some of these an outdoor track has been laid and operated. Five locomotives are available, and operations are very realistic and enjoyable. Games also are played. A Library of railway literature has been formed, and Debates and Lectures have added variety to the programme. A Chemistry and Photography Section has now been formed. Secretary: R. C. P. Gulliver, Foxbury, Stone Street, Nr. Sevenoaks, Kent.

TWYFORD GROVE—The layout is now very extensive. More rails and signalling equipment have been added, and a stud of 18 locomotives allows intensive and interesting operations. Fast troop trains and government specials are run in addition to the usual passenger and goods trains. Boys evacuated to the neighbourhood have formed an associated Branch, with the privilege of using the track. Secretary: J. W. C. Prescott, 6, Twyford Grove, Banbury.

ROCKPORT SCHOOL (CO. DOWN)—The Branch track has recently been relaid, and operations proved the new layout to be the best yet operated. A viaduct has been built of Meccano parts. A friend of the Branch has presented track and rolling stock, together with material for signalling the layout. It is hoped to start a Meccano Section. Secretary: P. C. L. Cosgrave, Rockport, Craigavad, Co. Down.

SOUTH WEST HOUNSLOW—Operations at track meetings proceed smoothly, but on one occasion a goods express was derailed at a point. Other traffic was kept moving as far as possible, using branch lines, and a special breakdown train was run to deal with the emergency. This was great fun, although the accident caused serious congestion. A garden layout is being planned for use during the coming months. Secretary: R. Bower, 12, Walnut Tree Road, Heston.

MONKSTOWN (CO. DUBLIN).—The usual timetable operations have been carried out on the Branch layout, and members are becoming expert in dealing with all problems that arise. On one occasion a small tank engine broke down, and was quickly replaced by a 4–4–0 locomotive. Locomotive power and speed tests also have been held. In these the Hornby E120 Special Tank and E220 Special distinguished themselves. The Branch now produces an excellent Magazine, which contains railway articles, competitions and news of Branch interest. Secretary: R. D. Pierce, 20, Monkstown Road, Monkstown, Co. Dublin.



Our illustration this month shows K. R. Cassells, secretary of the Wellington West (New Zealand) Branch, No. 361, Chairman Mr. T. Cassells. This Branch was incorporated in December 1938. Its programme includes track meetings and a special feature is made of visits to stations, goods yards and other places of railway interest.

SOUTH BIRMINGHAM.—Many Senior members have joined the forces. A Junior section is being formed. Recruits to this will gain valuable experience of operations of miniature railways, for the Branch has an extensive and realistic layout. Enquiries should be made from the Secretary. Meetings for Juniors are held on Mondays after 7 p.m. Secretary: E. Stamp, 156, All Saints Road, Kings Heath, Birmingham 14.

NEW ZEALAND

WELLINGTON WEST—Special meetings continue to be held. At most of these trains are run to timetable, and train despatchers are kept very busy. A Supper Meeting is held monthly, and at this timetable operations are carried out. The layout has been extended and improved by the addition of a turntable at one of the stations, and new rolling stock is regularly brought into service. All locomotives are tested, and the necessary repairs are carried out by the club's "Mechanic." Excursions are a prominent feature of the programme, and these include many special interesting railway trips. Secretary: K. R. Cassells, 26, Sugarloaf Road, Brooklyn, Wellington, New Zealand.

Proposed Branches

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested should communicate with the promoters, whose names and addresses are given below.

ACCRINGTON—A. C. Chapman, 4, Cromwell Street, Accrington.

ASHBY-DE-LA-ZOUCH—R. Eckersley, Osterley, Moira Road, Ashby-de-la-Zouch.

CARSHALTON BEECHES—H. J. Darlington, 12, Hill Road, Carshalton Beeches.

CLENT — B. Chadburn, Foresters' Home, Clent, Nr. Stourbridge.

COWDENBEATH—Mr. A. Sharp, 7, Keir Street, Cowdenbeath, Fife.

DONCASTER—A. Duffield, 12, Dundas Road, Wheatley, Doncaster.

FARNHAM—S. Sawkins, The Bungalow, Firgrove Hill, Farnham, Surrey.

GLASGOW—D. McLean, 49, Newark Drive, Glasgow S.1.

HOVE—G. D. Boland, 52, Hova Villas, Hove, Sussex.

LEIGHTON BUZZARD—L. Day, 81, Hockliff Street, Leighton Buzzard.

LEIGHTON BUZZARD—W. Avis, 15, Hockliff Road, Leighton Buzzard.

LONDON—H. L. Treasure, 35, Ryhope Road, New Southgate, London N.11.

NEW ZEALAND—E. Robson, 10, Troonville Avenue, Mount Albert, Auckland, New Zealand.

SEVENOAKS—B. Nathan, 4, Braeside Avenue, Sevenoaks, Kent.

WHYTELEAFE—J. Collier, 175, Godstone Road, Whyteleafe, Surrey.

Branches Recently Incorporated

387. BRIGHTON—Mr. R. C. Everett, 24, Coldean Lane, Brighton 6.

388. KETTERING—Rev. D. Sire, Blackfriars School, Laxton, Kettering, Northants.

389. LONDON—Mr. S. Salmon, 87, West Side, Clapham Common, London S.W.4.

A Portable Hornby-Dublo Layout

By "The Skipper"

THE Hornby-Dublo Railway described on this page is of the truly portable type, for it is arranged so that it is always ready for working, and yet when finished with it can be instantly packed up and put away.

The layout is arranged on a baseboard 12 ft. long and 4 ft. wide, but the baseboard is hinged across the centre so that it requires no more than 6 ft. length for storage purposes. A particularly interesting feature is that there are sides to the baseboard 6 in. in height, something like those of a bagatelle board, so that when the whole affair is folded up the layout is entirely boxed in.

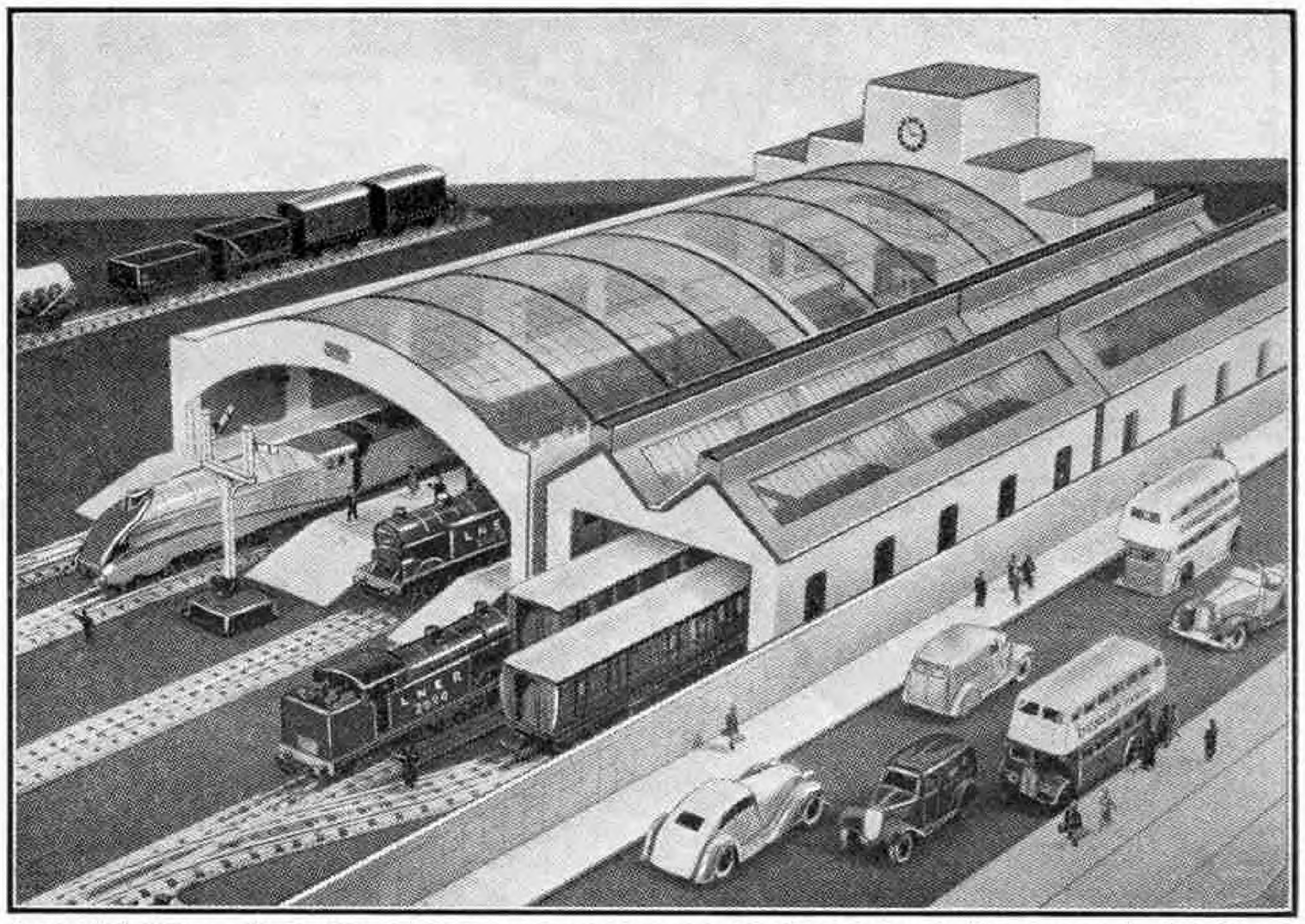
The track layout is shown by the diagram, and it will be seen that the main line consists of a double oval with loop lines and crossover connections. The centre part of the system is occupied by a terminal station and yards, with accommodation for engines, carriages and a set of goods sidings with a goods station. All the buildings, and in fact the whole of the equipment of the railway, are Hornby-Dublo products. The terminus lines are connected to the inner of the two main lines by diagonal tracks, arranged in such a way that trains leaving the terminus by one route do not have to be reversed in direction in order to arrive back at the terminus by the other route.

Good use is made of the latest Hornby-Dublo refinements such as Isolating Rails, Electrically-Operated Points and operating Switches, with the result that some interesting running schemes are possible. Control arrangements are such that at least three trains can be in motion at the same time.

Power is supplied from A.C. mains through two double output Dublo No. 2 Transformers, and the four circuits thus available are distributed in the following manner. The first circuit controls the terminus station and the engine shed, while the second circuit controls the goods yard. The inner main track and its two loop lines form the third circuit, the fourth circuit being the outer main track.

Although completed sufficiently for interesting working to be possible, the line is not yet provided with signals, and so far there are no scenic effects. These matters are to be attended to as soon as possible. Incidentally the 6 in. deep sides of the board will allow a realistic scenic background to be provided all round the railway.

The terminus station is built up of Hornby-Dublo City Station components. An unusual feature in miniature practice is the carriage depot arranged immediately alongside the terminus, the actual depot consisting of two of the new Hornby-Dublo Engine Sheds that were described in last month's "*M.M.*," placed end to end to form a long two-road shed. This is an ingenious adaptation of existing material that no doubt will be followed by other readers. The Sheds are well lighted, and the fact that the smoke vent is not really obtrusive allows the shed to be used as a carriage depot quite convincingly. The effectiveness



A terminal station with carriage depot alongside arranged as suggested on this page. The carriage depot is formed of two Hornby-Dublo Engine Sheds placed end-to-end.

of the arrangement is well shown in the photograph.

Naturally a railway of this kind, electrically controlled and of the "continuous main line with terminus" variety, offers endless possibilities in the development of fascinating operations. An "episode" or set of operations that has been found very successful commences with a set of three coaches on each of the departure lines in the terminus, the remaining road being empty. In the engine shed two 0–6–2 tank engines occupy one track, while on the other is a further tank and a 4–6–2 streamlined "*Sir Nigel Gresley*." The goods sidings are full, with about 14 vehicles distributed over the various roads.

The first move is to back the streamlined express engine from the shed to the centre platform of the terminus, where it is attached automatically to the coaches waiting there. This train then departs, and, having been worked on to the outer main line by way of the upper diagonal track and

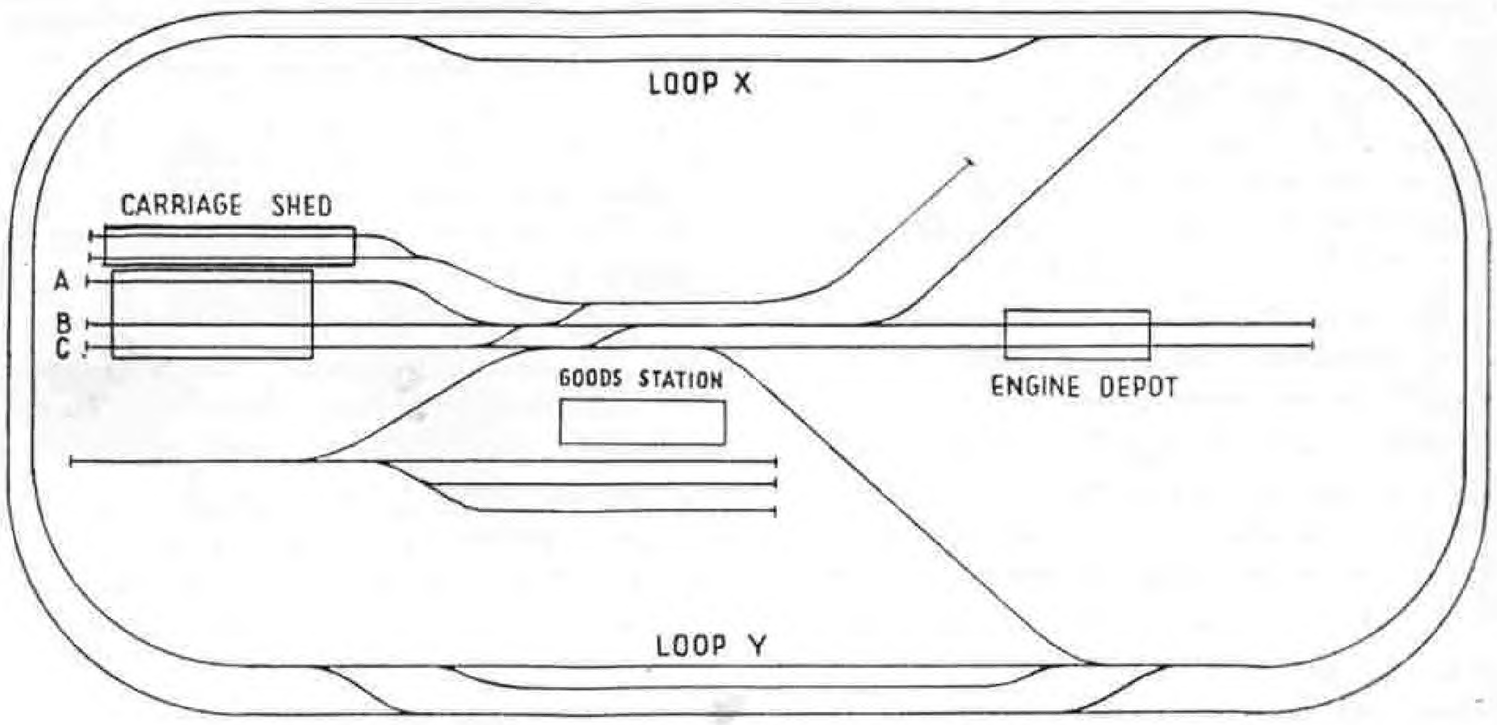


Diagram showing the layout described on this page.

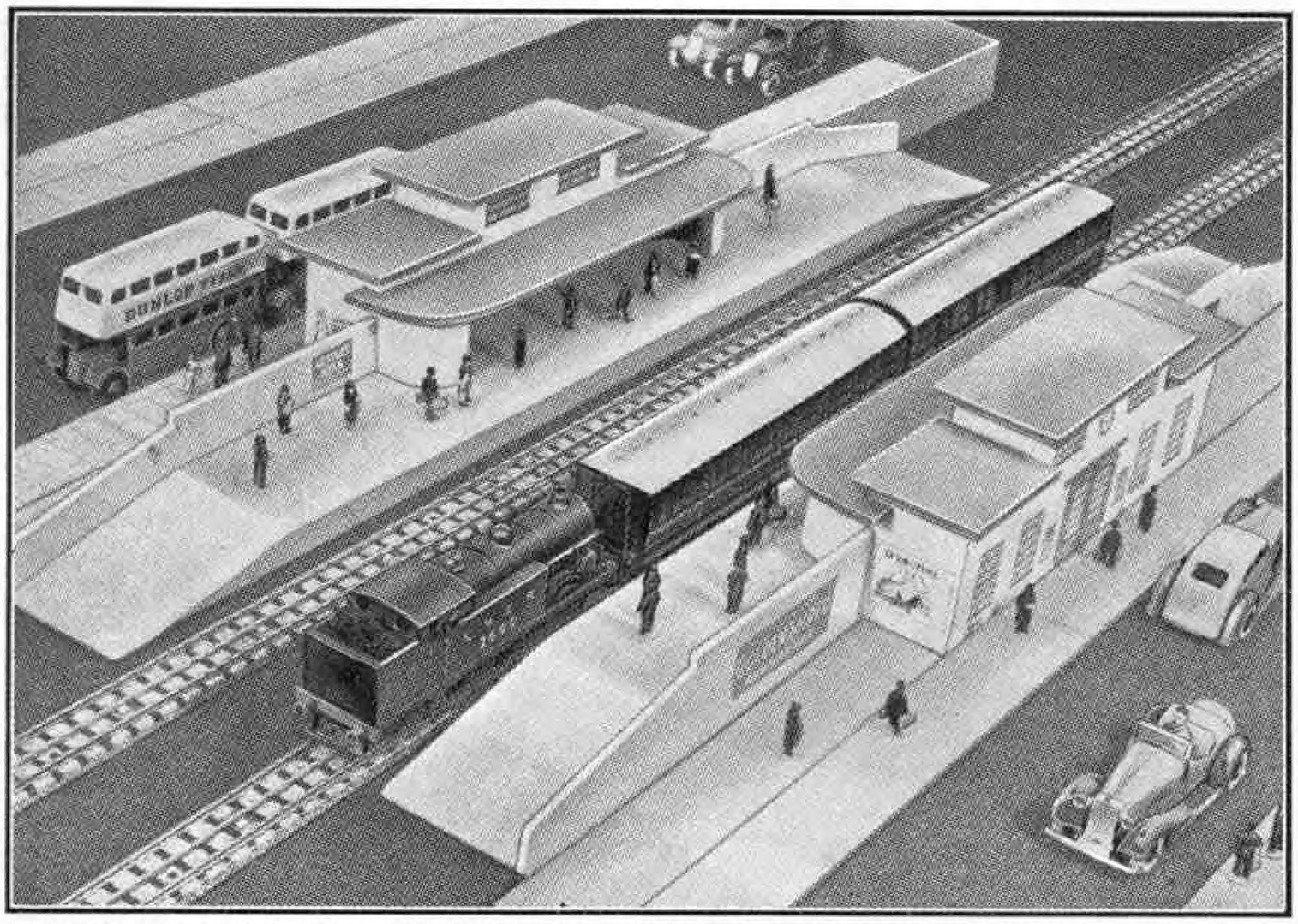
over a portion of the inner main line, is left running.

One of the two tank engines standing together then moves to the goods yard and makes up a train from the various vehicles standing there. It draws this train out on to the shunting spur that lies parallel with the terminus and is then uncoupled. The second tank engine then comes from the shed and backs on to the other end of the line. This train is now left running for the time being.

The engine still remaining in the shed now leaves and couples on to the second set of coaches waiting in the station. This train does not depart immediately, but waits until the shunting engine has run from the spur into the engine shed. This done, the goods train that we left running on the inner main track is worked into the upper loop line in the diagram. The suburban train can now leave the terminus and take the inner main line, where it makes two complete circuits and is then diverted into the lower loop and held there.

This allows the express with the streamlined 4–6–2 at its head to run over from the outer main line to the inner one, make a partial circuit of the latter, and then run into the terminus again via the lower diagonal, thus completing its journey.

The suburban train emerges from the lower loop, passes the goods train on the upper loop, and is then crossed over to the outer main line. (*Continued on page 262*)



A stopping train consisting of an Articulated Unit and an 0-6-2 Tank at a Station. Note the "car park" assembled by means of Dinky Toys Pavement sections.

Fun with a Hornby-Dublo Railway

A Chapter of Many Items

IN the last few articles in this series we have dealt with the newer items of Hornby-Dublo equipment and their uses. As a change this month we intend to describe various schemes in which standard Hornby-Dublo equipment is used for purposes slightly different from those for which the particular items have been designed.

The Hornby-Dublo System includes both express passenger and local goods Train Sets, but there is no reason to restrict the individual items to these particular duties. Quite frequently, for instance, it is necessary to operate short-distance or suburban stopping trains in the course of a running programme. For this purpose the standard 0–6–2 Tank Locomotive is ideal, for engines of this type are used as frequently for passenger as for goods service in actual practice. For coaches it is quite in order to use corridor stock; it is often the practice on real railways to use a main line set train on intermediate duties in between more important runs. Therefore the Hornby-Dublo Corridor vehicles can be used for stopping trains in miniature, and trains can be made up either with the single Corridor Coaches or with the Articulated Unit. The latter indeed is most useful for suburban work, being convenient in length for most stations, and requiring no coupling up of individual coaches, for the twin members of the Unit are permanently coupled together. The realistic appearance of a train consisting of the Articulated Unit and an 0–6–2 Tank Locomotive is well shown in the illustration on this page.

The same illustration contains an idea that has been followed up by quite a number of Hornby-Dublo railway owners. In order to make the road approach of a Station more realistic, it is usual to employ the Pavement sections of Dinky Toys No. 46. In addition to their use in the normal manner these sections can be used quite well to form miniature boundary walls and so on. In the illustration referred to a car park attached to the Station is formed in this manner. Such a feature adds to the realism of a suburban station and a few Dinky Toys motor cars of different kinds standing in the "park" complete the effect.

Long-distance freight trains of various kinds are bound to figure largely in the running programme of a Hornby-Dublo railway of any size. This brings up the question of locomotive power, the wagon supply being met by the excellent variety of stock now available in the Hornby Dublo System. The 0–6–2 Tank is a good engine for short distance work, but something larger is really required to look well on a main line freight train. It is necessary therefore to employ the 4–6–2 passenger engine for main line freight work as well as its normal duties.

The upper illustration on page 257 shows an express freight train of Hornby-Dublo Vans of different kinds, and this suggests the question of which particular vehicles are suitable for use on such trains. This again makes it necessary to consider whether the trains are supposed to be fitted with automatic brakes throughout or are merely composed of a proportion of vehicles so fitted. In general it may be taken that all Hornby-Dublo Vans represent brake-fitted prototypes, so that meat, fish or cattle trains can be run as express freight trains of the highest importance. Similarly vehicles conveying such traffic can also be attached to passenger trains quite correctly. This applies to the Horse Box also.

As a rule open wagons will not be classed as fitted with automatic brakes, but they can always be included in the composition of a fast freight train of the less important kind. In that event the supposedly "brake fitted" stock should be assembled together next to the engine, the "non-fitted" wagons being marshalled behind together with the Brake Van.

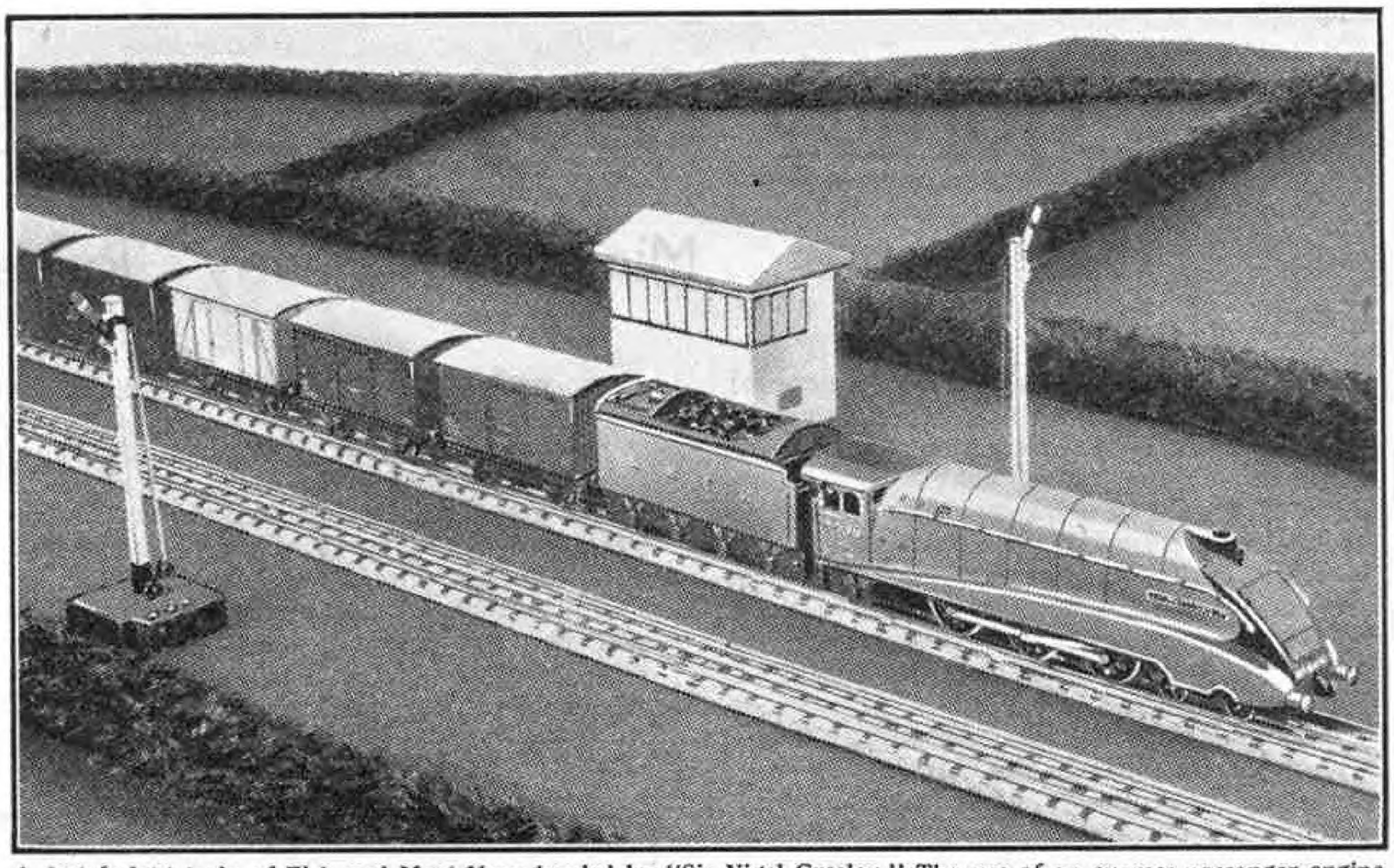
The high-capacity bogie Brick Wagon L.N.E.R. is an exception to the general rule regarding open wagons. It represents a real fitted wagon, and express brick trains composed entirely of such stock are regularly operated on the L.N.E.R. In miniature it is unlikely that many of these Wagons will be included in the rolling stock list. A single one however can form part of an ordinary freight train and it can be placed next to the engine for the sake of its "braking" properties.

We have already referred earlier in this article to schemes connected with ordinary Stations. It may be useful to new readers to recall the article in last month's issue in which the City Station Outfit was described. There various ways of employing the different components were con-

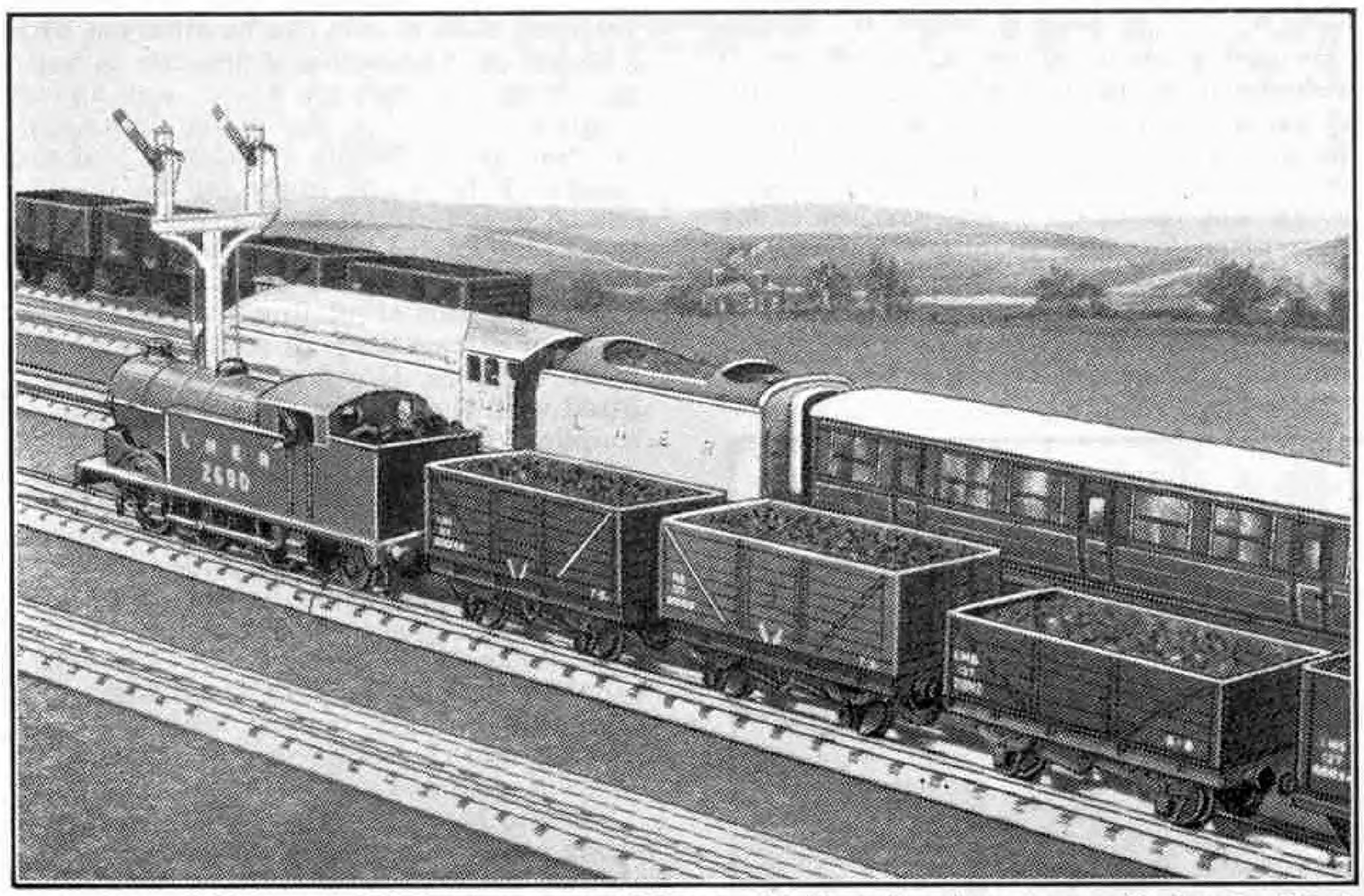
sidered, and a particularly effective scheme was that which involved the arranging of a short platform at one side of a terminus for dealing with parcels and perishable traffic. Road access to this platform was gained direct by removing the characteristic panels in the side wall of the Arched Roof section, thus allowing road motors to back right up to the platform itself. The scheme of using two Engine Sheds placed end to end to form a carriage depot, mentioned in another article in this issue, is another novel idea that is worth while following up.

Signals form another item of Hornby Dublo equipment that can be used in various ways without being unrealistic The normal uses of the different types have already been dealt with in these pages, but there occasionally occur situations in which certain signals are used in a special manner. For instance, at a junction it may be necessary for both "home" and "distant" indications to be given on account of the shortage of the respective sections ahead. In place of the ordinary Junction Signal, therefore, two Double Arm Signals must be used on a Hornby-Dublo layout. Standing side by side these look very effective and provide an interesting variation from the usual practice.

Similarly the Junction Signal, both of "home" and "distant" pattern, can be used quite correctly on a normal stretch of main line without any junction. If there is a long loop line parallel to the main line, for instance, and signals are required for each of the two tracks, there may not be room at the extreme left-hand side of the railway for the signals, this being a favourite position for them. Therefore a Junction Signal can be used, its main post being planted between the two tracks to which its semaphores apply. In "reading" the semaphores it is only necessary to remember that the one on the left-hand side of the Signal applies to the left-hand track, and that on the right applies to the right-hand track. In such a situation it is of course possible for both semaphores to be "off," or in the "line clear" position, together; this never applies when the Junction Signal is used in the ordinary way to protect a turn-out from the main line. This special use of the Junction Signal, with both semaphores "off," is shown in the lower illustration on this page.



A fast freight train of Fish and Meat Vans hauled by "Sir Nigel Gresley." The use of an express passenger engine shows that the train is an important one.



An express overtaking a coal train running on a parallel track. This illustration shows the use of a Junction Signal to control trains on "fast" and "slow" roads.

Although special attention is usually given to Hornby-Dublo electrically-operated railways in these pages, the schemes detailed so far can be employed equally well on lines where the engines are clockwork-driven. On clockwork railways too an interesting operation can be made of double-heading a long goods train. The use of an additional engine of the same type gives the ideal combination for double-heading, for each engine works well "in step" with the other. It is quite exciting to see a train made up say of Hornby-Dublo Coal or Open Wagons headed by a pair of 0–6–2 Tanks. Such a feature may possibly provide a convenient means of returning the pilot engine to its own shed or to another part of the line for further duty. It is certainly preferable to having to run the "engine" light over a considerable part of the track.

With passenger trains double-heading by tank engines is rare in actual practice, and is scarcely necessary in miniature in any case. The average passenger train load on a Hornby-Dublo system is not such, as a rule, as to give any great difficulty to either the streamlined 4–6–2 or the 0–6–2 Tank Locomotive.

Hornby-Dublo equipment is very adaptable, and as this article shows, realistic results can be obtained in quite a number of ways. There is a special fascination in "doing things differently."

Hornby Gauge 0 Operating Hints

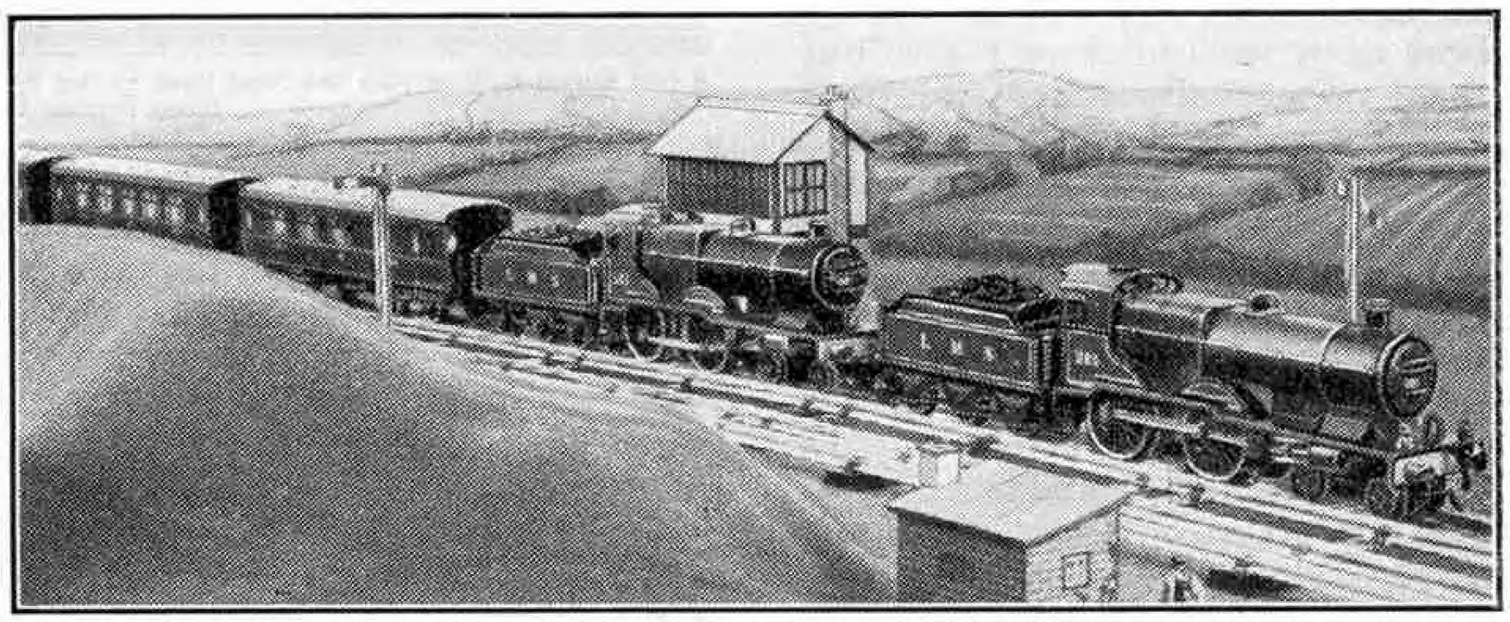
Miniature Railway "Rules"

IN operating his trains and in the general management of his line the experienced miniature railway owner automatically works to certain "rules" that he has found to be of benefit in working. Apart from the usual instructions that accompany each Hornby Train Set and Locomotive, there are various things that can only be learned by actual experience. In this article we deal with some of these for the benefit of younger readers.

General instructions regarding track laying are contained in the Hornby Railway Company Booklets, both Senior and Junior, and in the well-known publication *"How To Plan Your Hornby Railway."* There is little need therefore to add much more here except to remind readers of the necessity of using the Rail Connecting Plates and Points Connecting Clips in order to maintain sound joints with Hornby Tinplate Rails. In their anxiety to get on with the actual running, younger enthusiasts are apt to overlook these useful accessories, and are disappointed when derailments occur as the result of rails working apart at the joints. This does not apply when Hornby Steel Track is in use. The Steel Rails hold together very well without any special means of securing them apart from the fishplates at the rail ends; in any case Steel Rails are rarely used for temporary lines but are employed mostly on permanent layouts and are therefore screwed down.

It is quite exciting to make up a really long train, but it is very annoying to find that the vehicles immediately behind the engine sometimes tend to topple over inward when the train is rounding the frequent curves on the miniature railway system. This is invariably caused by heavy and light vehicles being mixed together without discrimination. As far as possible the heavy stock, and any items fitted with die-cast wheels, should be assembled together behind the engine. Here they can run freely, and the lighter stock behind will then perform satisfactorily, even on a severely curved track.

Similar care is needed when an odd van, possibly for perishable goods, is required to be attached to a passenger train consisting of bogie stock. Unless it is fitted with die-cast wheels, a four-wheeled van should not be attached between the tender and the passenger portion of the train. Here it may tend to turn over when the engine is pulling hard round a curve, and on the other hand when the train is retarded, especially by means of a Brake Rail on a clockwork railway, the heavier vehicles behind tend to "nip" the lighter van and push it off the rails. Where all vehicles have die-cast wheels no difficulty is experienced, although it is well not to have very many four-wheeled vehicles between the tender and the bogie passenger stock. The tail of the train therefore is the best place for vans requiring conveyance by passenger train, particularly if they have only the standard pressed steel wheels.



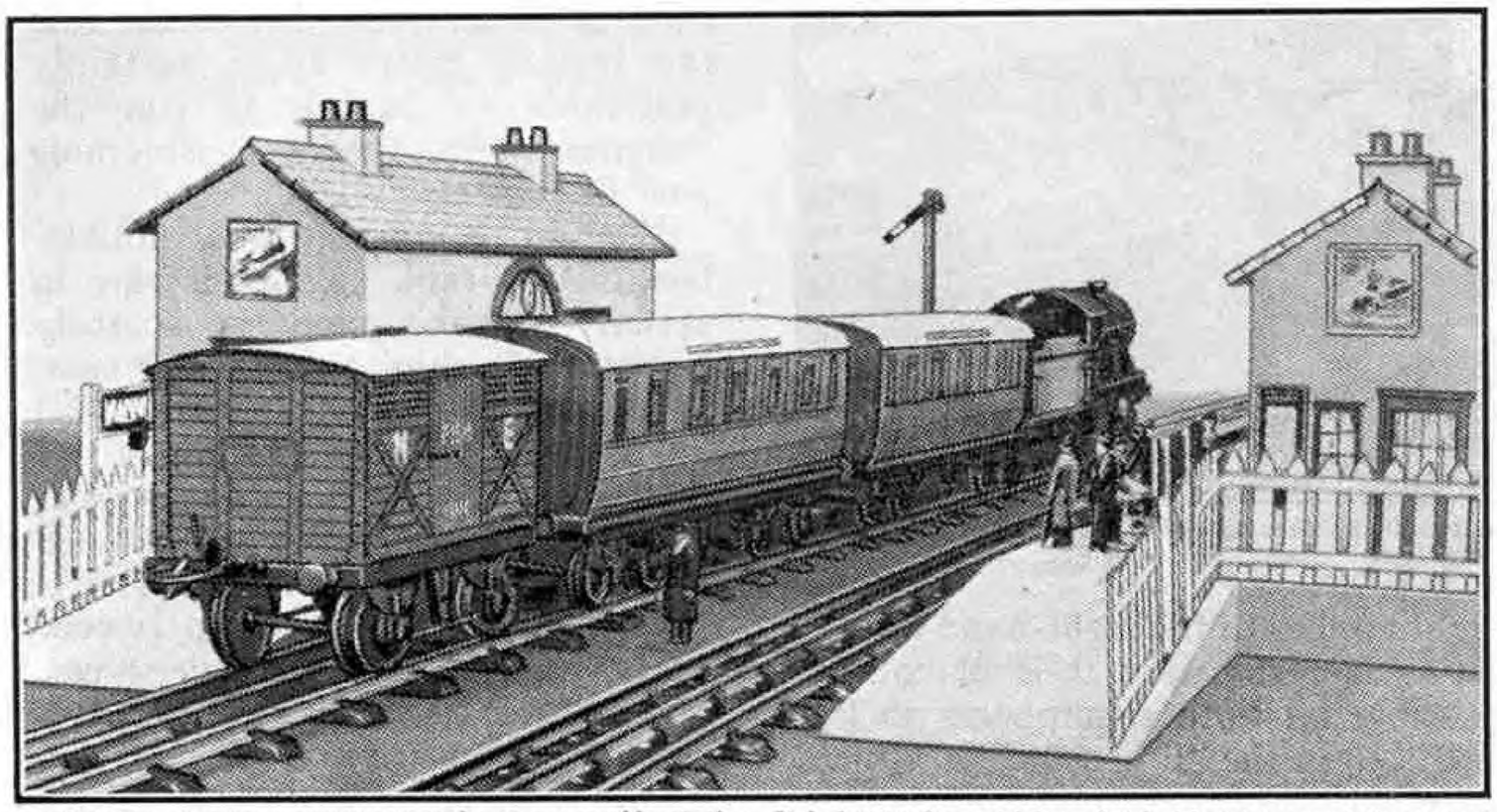
A Hornby L.M.S. express headed by two No. 2 Special "Standard Compounds." The use of two similar engines on a piloted train always gives the best results.

Sometimes a heavy train on a clockwork railway will require the use of an assistant or pilot engine, but mishaps may occur if the pilot is unsuitable in type. There should not be a great difference in the power or length of run of the two engines used. If the engines are of unlike types it is wise to adopt the practice of certain sections of the L.N.E.R. and place the heavier and more powerful engine in front. The best results are obtained, as so frequently happens in actual practice, when the two engines are of the same class. A favourite combination that has done much notable work on the L.M.S., for instance, is a pair of Standard Compounds, and in miniature similarly good results can be obtained with a couple of Hornby No. 2 Specials. A train in charge of two of these well-known engines is shown in the upper illustration on this page. When starting a piloted clockwork train the brake on the leading engine should always be released first; then the second engine can be started up and the train will get away in good style.

This question of piloting involves the use together of two kinds of couplings, for the front ends of Hornby Locomotives are fitted with the ordinary single link type of coupling, while tenders have the standard automatic coupling. When using the two kinds together the loop of the automatic coupling should always be placed over the hook of the single link type. This avoids the trouble that invariably occurs when it is attempted to place the single link on the specially-shaped hook of the automatic coupling. It may stay in place while the engine is pulling, but as soon as it is checked and the train "surges" slightly the link will uncouple and the train will divide.

Finally, to end this article at an appropriate point on the line, Buffer Stops should always be approached by a length of straight track if at all possible. This makes it certain that any vehicle shunted against them, or any engine that may run up to them, will meet the Buffer Stop squarely. This is not possible if the approach track is curved, for then one buffer only of the vehicle will engage the Buffer Stops, and a derailment is likely.

We invite readers to send in their own hints for publication.



Attaching a van to a passenger train at a wayside station. It is better for vehicles of this kind to run at the tail of the train for reasons explained in this article.

On the Track
of the Gauge 0
"Yard Express"

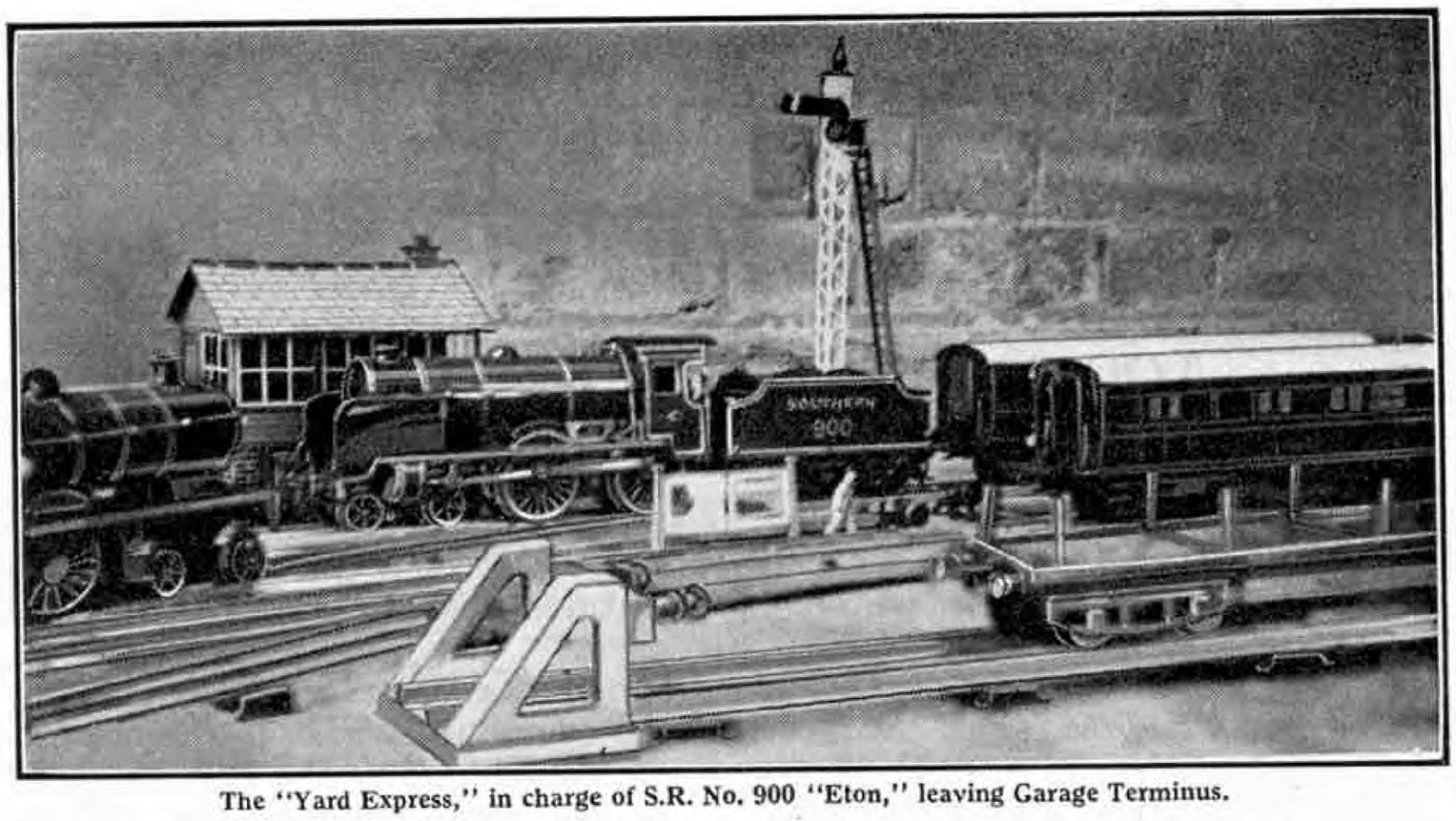
THE layout shown in the illustrations on this page is operated by D. James of Bromley, Kent. Apart from the interest of the working arrangements, the line is notable with regard to its situation, and also from the fact that although the line is principally worked by electric locomotives, several clockwork engines are in use. The railway is laid partly in a garage and partly in the open, so that it is rather different in character from many of the systems that have been described in these pages.

The layout is a non-continuous one, and the main terminus is named *"Garage"* owing to its situation. The through station, in the open, is appropriately known as *"Farmheath,"* and the other terminal is called *"Yard."* *"Farmheath"* is the junction point for a branch line that serves a station named *"Airport,"* the purpose of which is shown by its title. The *"Airport"* branch does not actually diverge at *"Farmheath,"* but this station forms the changing point for traffic working.

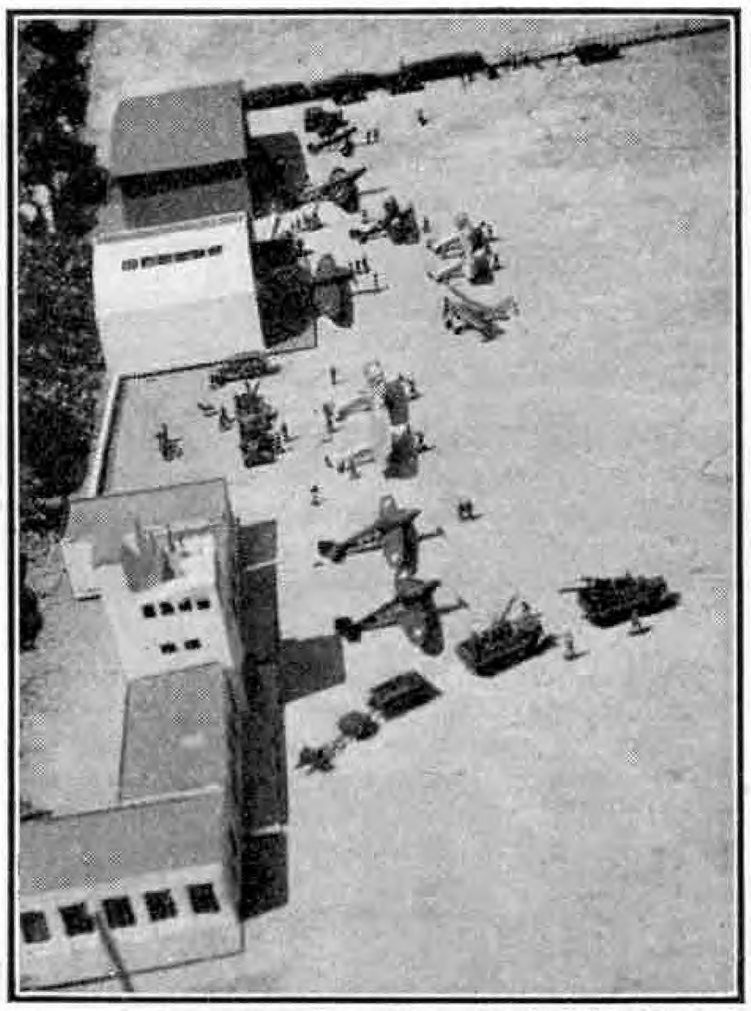
All the locomotives and most of the rolling stock are of Hornby manufacture. Southern Railway practice is represented on this system so that naturally enough the favourite express engine in use is the Hornby E420 "Eton," which is ably assisted in passenger train working by one of the popular E220 models of the S.R. "L1" class. The well-known 4–4–2 S.R. tanks are represented by two Hornby E220 Special Tanks. The clockwork engines include one of the old Hornby No. 2 4–4–4 tank locomotives, another "L1," and a 0–4–0 tank. A "foreign" locomotive, for an S.R. system, is one of the L.N.E.R. "Hunt" class.

For the principal trains there are four No. 2 Special Pullmans and five No. 2 Corridor Coaches. For miscellaneous "long-distance" and through coach working there is an L.M.S. No. 2 Saloon Coach and a Metropolitan vehicle. Shorter-distance and local working are provided for by two No. 2 Passenger Coaches and five No. 1 vehicles of the same type.

There are some 50 vehicles of different kinds in use for freight traffic. Luggage Vans, Milk Vans and other vehicles used for perishable and fast train freight are included, in addition to the usual variety of stock required for miscellaneous goods traffic.



The "Yard Express," in charge of S.R. No. 900 "Eton," leaving Garage Terminus.



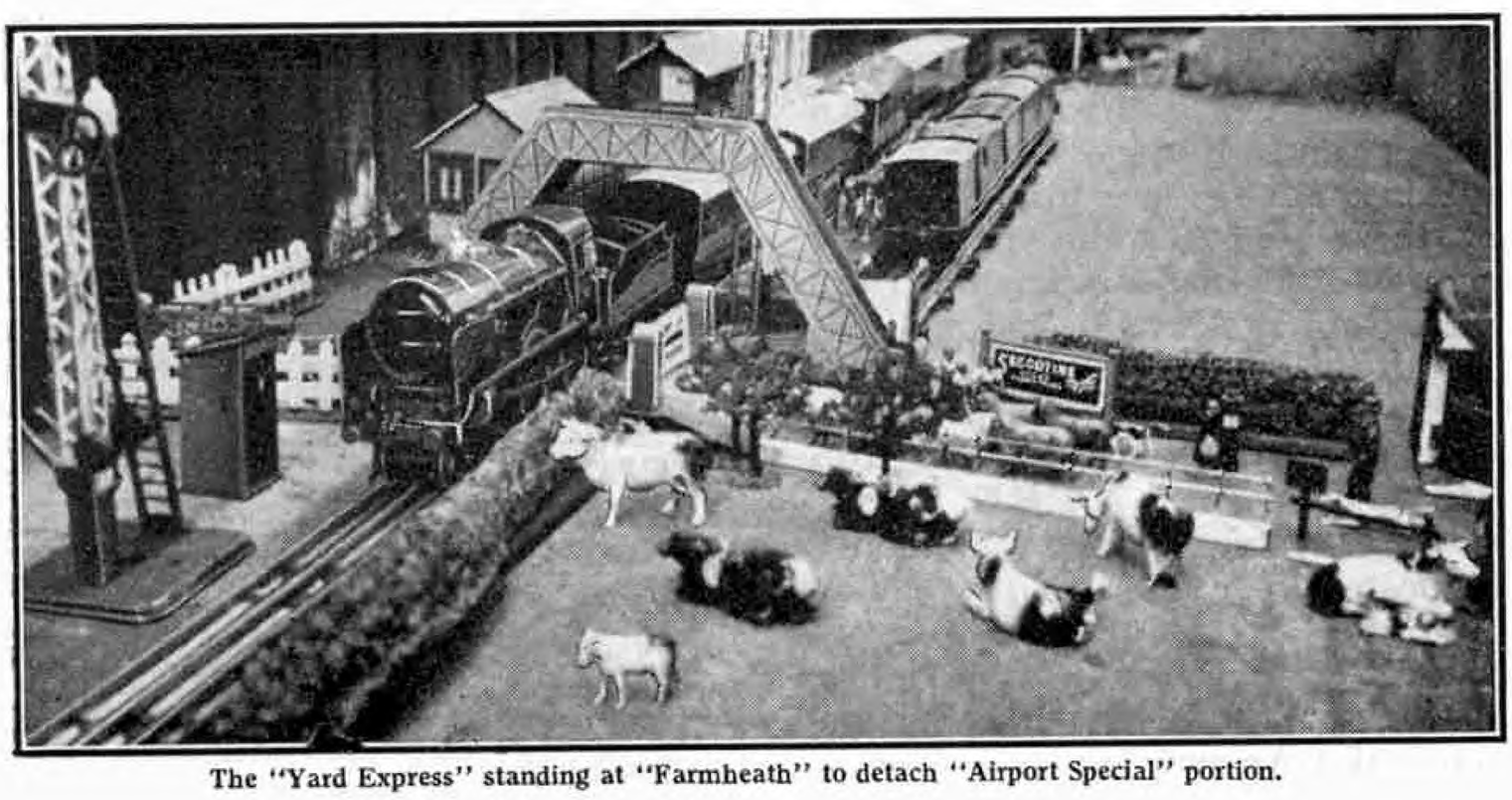
The Airport served by the line showing the Control Buildings, hangars and landing ground.

In order to obtain a general idea of the layout of the track, let us take a trip on the combined 12.35 *"Yard Express and Airport Special."* Having arrived at the station a few minutes early, we find that our train consists of three Corridor Coaches, a Pullman, a local Passenger Coach and a Luggage Van. The two latter vehicles bear the name boards *"Airport Special,"* and the first three make up the *"Yard Express"* portion, being gangwayed throughout with Hornby Corridor Connections. Our engine is just backing on to the train and we see that it is S.R. No. 900 *"Eton."* Let us now board the train as there are only two minutes before the departure. As we settle back comfortably in our luxurious compartment, we see a porter loading something that looks like an aero engine into the luggage van. The signal arm drops, the Dinky Toys Guard is waving his flag and we are off!

"Eton" gets away in grand style, and as we pass over the points we catch sight of a tank engine shunting a row of milk vans. The sidings are very extensive and line upon line of goods wagons and coaches are to be seen. On the goods loading platform we notice a farm tractor being loaded on to a Flat Truck. By now we have well cleared the terminus and are gathering speed down a falling gradient of 1 in 70. We soon run into a miniature cutting that is actually bored through the flower-bed!

We emerge into the open once again, speed falls, and we come slowly to a stop in *"Farmheath"* station. Although our train is an express it is necessary to stop in order to detach the *"Airport Special"* portion. As we start from *"Farmheath"* on the second half of our journey, we pass a level crossing at which a flock of sheep are waiting. We now accelerate, passing a hunt in full cry. Soon we slow down as a permanent way slack is ahead, and a little later we see workmen re-ballasting the track. After negotiating another steep gradient we plunge into a tunnel, and on emerging we find we are travelling round a sharp curve. The *"Airport"* branch sweeps away to our left and in the distance we see the Airport itself. Soon we stop for a signal check just outside *"Yard"* station. On restarting we pass the engine and repair sheds, and then we slip into No. 1 platform at *"Yard"* terminus.

The end-to-end character of this interesting line makes it particularly suitable for systematic working.



The "Yard Express" standing at "Farmheath" to detach "Airport Special" portion.

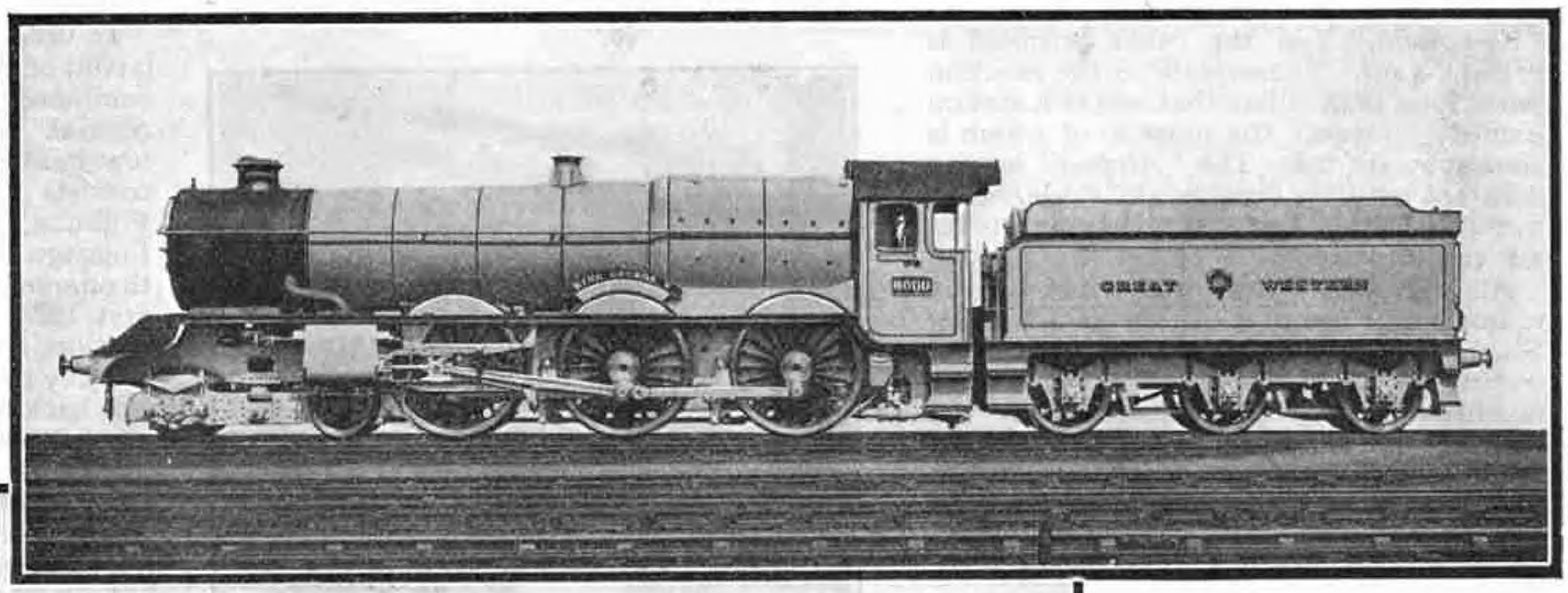
HORNBY RAILWAY COMPANY COMPETITION PAGE

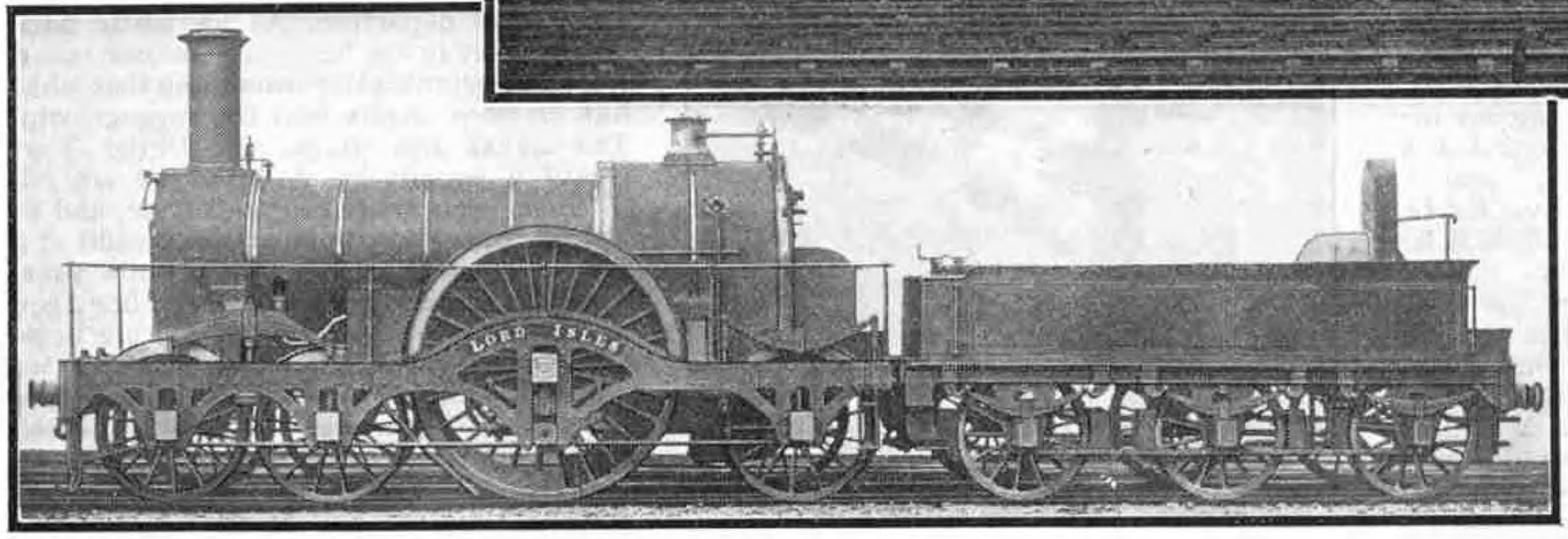
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

LOCOMOTIVE PROGRESS CONTEST

This month we ask readers to compare the modern locomotive with its predecessor of the middle of last century, and to enable them to make a direct comparison we illustrate on this page selected locomotives of these two periods. One of these is "*Lord of the Isles*," the most renowned of the old G.W.R. "Iron Duke" locomotives, which was built in 1851 and was continuously in service until 1884 with her original boiler intact. During her lifetime "*Lord of the Isles*" ran 789,000 miles! The upper illustration shows G.W.R. No. 6000 "*King George V.*" The contrast between the two locomotives is remarkable.





Apart from the great difference in size and power, the modern locomotive has a symmetrical outline and general efficient appearance that makes its ancestor look crude.

H.R.C. members will find it interesting to decide what are the main features or developments of design that make the present-day locomotive we have chosen so greatly superior to its fore-runner. We have settled upon the certain points for the comparison they are asked to make in this contest. These are: 1. Power and speed; 2. Smoothness of running; 3. Economy in fuel and water; 4. Length of continuous run; 5. Safety in operation. For the subject of our competition this month we want H.R.C. members, both Senior and Junior, to consider each of these five headings in turn, and under each to state briefly the features included in the modern engine that accounts for this superiority. Prizes will be awarded to the competitors who, in the opinion of the judges give the best accounts of the features under the various headings in the previous column.

The contest will be divided as usual into two sections, Home and Overseas, in each of which will be a Senior and Junior Section, thus making four sections in all. In each of these four sections prizes will consist of Meccano products to the value of 15/–, 10/6 and 5/– respectively.

Envelopes containing entries should be clearly marked in the top left-hand corner "*H.R.C. Locomotive Progress Contest*" and should be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st May. The closing date for the Overseas Section being 31st August.

Layout Planning Contest

This month we have decided to ask members to submit designs for layouts based on a main line oval, with either double or single tracks. Two terminal stations, sidings and any other features necessary to make a model railway practicable and interesting for passenger and goods traffic may be added. The layout must be one that can be constructed from the Standard Hornby Tinplate Track, and it must not be more than 15 ft. long or 10 ft. in width. No cost restrictions are imposed.

The contest will be divided into two sections, one for the Home members and the other for Overseas members of the H.R.C. In each there will be prizes of Hornby Train or other products manufactured by Meccano Limited to the values of 21/–, 15/– and 10/6 respectively. Several consolation prizes also will be awarded.

Entries must be addressed "*H.R.C. Layout Planning Contest*," Meccano Ltd., Binns Road, Liverpool 13." Each competitor must write his name, full postal address, age and H.R.C. membership number on the back of his entry. The closing dates in the Home and Overseas Sections are 31st May and 31st August respectively.

COMPETITION RESULTS

HOME

February "Engine Names Contest."—First: E. F. Jones (61494), Nantwich, Cheshire. Second: I. G. Richards (63497), Nantwich, Cheshire. Third: C. E. Wrayford (6039), Bovey Tracey, Devon.

February "Drawing Contest No. 1."—First: C. O. Hatton (44589), Worcester Park, Surrey. Second: E. Oldham (43390), Hyde, Cheshire. Third: J. P. Tyrrell (31470), Walton-on-Thames, Surrey.

OVERSEAS

November "Errors Contest."—First: R. Corley (58586), Ontario, Canada. Second: W. R. Hibbins (64719), Natal, South Africa. Third: T. A. Wade (63755), Johannesburg, South Africa.

November "Articles Suggestions Contest."—First: R. Myburgh (37538), Cape Province, South Africa. Second: T. A. Wade (63755), Johannesburg, South Africa. Third: D. Murison (37642), Buenos Aires, South America.

Olive Trees

Trunks that Resemble Prehistoric Monsters

NATURE has her own particular way of dealing with trees that have served their purpose and done their life's work. Some seem to wither and die immediately their usefulness ceases, as though they had no further interest in life. Others refuse to admit that their allotted span has been reached, and year after year make a feeble effort to join in the Spring-song and Autumn glory of the forests.

There is one tree that history throughout the ages repeatedly mentions, which, though it might reasonably be ignored by the cultivator and pruner in the belief that what he sees is but the mere carcase of a long forgotten tree, refuses to die in that fashion. Instead it throws out fresh shoots and branches, which blossom and bear fruit year after year. Such a tree is the olive.

The stilt-like form commonly assumed by old stems arises in the following manner. The wood, which is much favoured by cabinet makers, is very subject to the attack of a rot fungus. The affected portions become completely disintegrated and are then cut out. This process is



The fantastically distorted trunk of an ancient olive tree.

repeated again and again without the wounds so produced being protected by the application of tar. In this way the stem finally becomes tunnelled and split, and separates into columns of varying thickness, so that the upper part of the tree looks as if it were raised on stilts.

The only communication between the soil and the upper part of the tree is by means of these props; and yet these olive trees are still vigorous, putting out new branches and leaves every year and blossoming and producing fruit. They derive their necessary food from the ground by supplies which have no other upward path than the wood of these props. At Lake Garda in Italy, a district famous for its olive groves, it is even believed that by the treatment described above the productiveness of the trees is increased.



An olive tree trunk that has been twisted into something resembling a prehistoric monster. The lower part of the trunk has split into three columns.

One authority, referring to the old olive trees in Greece, writes: "The appearance of an old olive tree is very remarkable; with its lowly stems which easily split apart, then become distorted into screw-like forms and yet again are reformed into pyramidal shapes. Hunch-backed and beset with hemispherical and quite irregularly shaped stone-coloured outgrowths, the lower part of the tree often resembles a mass of rock, from a cleft in which issues a flourishing leafy bush."

This evergreen tree of rugged, much branched habit and slow growth, reaches in its prime a height of anything from 20 ft. to 40 ft., and in season gives a white flower. There are about 30 species widely distributed over the warmer temperature regions of the globe. Its growth has never been by any means successful in this country, but some trees once bore fruit in Lord Edgecumbe's garden, near Plymouth. At Kew Gardens it has lived for a good many years, but is only grown for its interest and associations. It is strictly a native of Asia Minor and Syria, but for many generations has been very largely cultivated along the shores of the Mediterranean, particularly in Greece and Italy, where the fruit forms the basis of a thriving industry.

The best olives imported by Great Britain are obtained from the South of France and West Italy, but perhaps the most important product of the olive tree is its oil, which is usually produced in three qualities. For the first operation, the fruit is placed in woollen bags, and a slight pressure applied. This gives the virgin oil, and is of the finest quality. The remaining pulp is moistened with water, and by repeating the pressure, though to a greater extent, the second quality of oil is obtained. A third steeping in water and a further pressure gives the third grade oil.

As will be seen from our illustrations, the resemblance these old trunks bear to prehistoric animals and legendary monsters is remarkable.

We are indebted to the Editor of "The P.D. Review" for permission to reproduce this article and for our illustrations.

* * * *

The olive tree is frequently referred to in the Bible, and at Jerusalem is the famous Mount of Olives. The olive branch is regarded as a symbol of peace and plenty. The victors in the various contests in the Olympic games of Ancient Greece were crowned with wreaths made from olive sprays.

New Dinky Toys

This month's additions to the range of Dinky Toys are splendid miniatures of two more types of bombers. The first is a reproduction of the latest or long-nosed version of the well-known "Bristol" Blenheim, available in Camouflage (Dinky Toys No. 62d) and in Aluminium Finish (Dinky Toys No. 62b). This is one of the types of twin-engined bomber extensively used by the Royal Air Force. Blenheims have taken part in raids on Kiel and Borkum.

The long-nosed Blenheim is known as the Mark IV, and is fitted with two 920 h.p. "Bristol" Mercury engines that give it a top speed of 295 m.p.h. Normally it carries a crew of three and a considerable bomb load, and it is armed for defence against enemy pursuers. It has been adapted also for fighter duties. The machine has a range of 1,900 miles.

The other new Dinky Toys aircraft is a model of the German Junkers Ju 89 (Dinky Toys No. 67a), a military development of the Ju 90 40-seater air liner. This four-engined bomber is one of the largest used by the German Air Force. It carries about 8,000 lb. of bombs, and has a top speed of about 260 m.p.h. There are gun turrets in the nose and stern, and machine gun positions in the top and bottom of the fuselage.

The Closest Motor Race Ever—

(*Continued from page 217*)

chased for the full 15 laps.

By lap 13 they had both passed Goodacre and were now first and second in the race, which fact I confirmed by signalling to Bira. At last they passed our pit for the 14th and last time. With the utmost anxiety I waited for them to re-appear. Could Bira really do it?

At what seemed long last they came down the hill, Bira in front. Dobson made another magnificent attempt at Stadium Dip, but could not get by, and Bira passed the finishing line by just half a length ahead of Dobson. Surely it was the closest motor race ever!



A reproduction, by permission of the National Savings Committee, of a splendid poster designed by Mr. Tom Purvis to encourage the sale of National Savings Certificates.

Resignalling with Colour-Lights—

(*Continued from page 219*)

the signals at Eryholme were not working.

While engineers were busy in the new signal boxes testing out and coupling up, so-called telephone block working was being used to get the trains through. During the progress of the work all south-bound trains, for example, were stopped at Eryholme Junction; one of the temporary men, acting variously as "look-out," or pilotman, climbed up to the footplate and in each case told the driver to ignore all signals, and proceed to Cowton, the next signal box, for further instructions. Later in the day when most of the work was complete the new colour lights were functioning; Cowton box had been finally cut out and trains were able to run through from Eryholme to Wiske Moor, though stopping for instructions at both places.

During the day, while unobtrusive and intricate work was being done inside the cabins, and at the various locations along the line, some quite spectacular demolition was in progress. Men with oxy-acetylene blow-pipes were busy cutting up the old point rodding; sledge-hammers were wielded with a will, and many an old mechanical roller-frame, or signal lamp went into scrap iron at one blow. To have dismantled completely all the old mechanical signals on the opening day would have taken too long, so the semaphore arms were just sawn off. In one or two cases however considerations of sighting the new colour-light signals called for the removal of the old structures.

Again there was no time to be wasted, for even on a Sunday there is a fair amount of traffic passing on the main line; all such big demolition jobs naturally had to be done in the intervals between trains. A bracket signal post just outside the Eryholme signal box provided quite a thrill. The mast was a lattice tower; the cross lattice was quickly cut with the blow-pipe, and then two of the main legs were tackled, after rust and scale had been chipped off. The deadly flame went through each leg in less than two minutes; the gang, with ropes attached, gave a sharp pull, and the other two legs quickly collapsed, sending the whole structure crashing to the ground. Twenty minutes clearing up, and the next train was able to come through.

By late afternoon all the colour-light signals had been brought into commission and it only remained to carry out the final inspection. A curious little cavalcade then set out from Eryholme, first a petrol-driven "bogie"—a kind of glorified platelayer's trolley—and then an inspection saloon pushed by a locomotive. The bogie went ahead, and engineers watched from the saloon. In such a test the bogie acts as the equivalent of a train; when it passes a colour-light signal the watchers in the saloon see the light change from green to red and know that all is well. The bogie in the meantime is speeding on to the next signal, and on passing that the first signal tested changes to yellow, as the bogie is now one section ahead. So they proceed from signal to signal right through the section, up one line and down the other, and when all has been seen satisfactory the new signal boxes are handed over to the traffic department.

A New Meccanograph—

(*Continued from page 243*)

Gear 33 on the end of compound rod 9, which engages with a 1½" Bevel Gear fixed to a Rod 27 journalled as indicated. A second 1" Gear 28 on Rod 27 engages the 1" Gear on the spindle of the Designing Table.

The sliding movement of the carriage 6 and the traversing action of the crown head give the motion of the pen. The third movement, that is the rotation of the table, does not affect the movement of the writing arm.

The traversing movement and the sliding movement can be employed together if desired, or the carriage 6 may be kept stationary and the traversing movement of the arm only be used. To obtain this result the Strip 35 is removed from the Threaded Pins 41 and 37.

Parts required to build the Meccanograph: 1 of No. 1; 1 of No. 1b; 3 of No. 2; 5 of No. 3; 2 of No. 7; 3 of No. 9; 6 of No. 12a; 3 of No. 13; 2 of No. 13a; 2 of No. 14; 4 of No. 15a; 5 of No. 16; 1 of No. 16a; 3 of No. 16b; 1 of No. 22; 1 of No. 23; 3 of No. 24; 1 of No. 25; 4 of No. 26; 1 of No. 27; 4 of No. 27a; 1 of No. 28; 1 of No. 30a; 1 of No. 30c; 2 of No. 31; 66 of No. 37a; 64 of No. 37b; 14 of No. 38; 1 of No. 45; 6 of No. 52; 1 of No. 52; 1 of No. 57c; 25 of No. 59; 2 of No. 62b; 5 of No. 63; 2 of No. 70; 1 of No. 107; 2 of No. 108; 3 of No. 111; 2 of No. 115; 1 of No. 116; 2 of No. 133; 2 of No. 186; 1 of No. 212; 19 of No. 217b.

A Portable Hornby-Dublo Layout—

(*Continued from page 254*)

Then the goods train leaves the upper loop and continues its journey on the inner main line, while the suburban train at the same time traverses the outer track. While this is going on the shunting engine that we left in the shed runs into the station and draws out the now empty coaches of the express, shunting them into the carriage shed or into one of the departure platforms. It then returns to the shed, and the express engine, now released, also goes to the shed.

Then the goods train from the inner main line is worked into the centre section of the layout and stops in the shunting spur, whence its engine shunts the wagons into the various sidings. The suburban train also is worked into the terminus; the shunting engine from the shed draws out the coaches of this train and pushes them either to the carriage shed or the remaining departure road. The various tank engines now go finally to the engine shed.

The last move is to turn the express engine round by running it from the shed, backing it out of the centre section via one diagonal part of the inner main line, and in again via the other diagonal. Matters are now substantially as they were at the start of the programme. The same procedure can be followed again, or alternative schedules can be worked.

Astra Pharos Fort Gun—A Correction

One of the items illustrated in the announcement of Astra Pharos Ltd., Landor Works, Askew Road, London W.12, on page 221 of our April issue was our advertiser's Fort Gun. The price of this was given inadvertently as 2/11 instead of the correct price 3/11. We regret any inconvenience that this may have caused.

THE MECCANO MAGAZINE

R·A·F RADIO FUND

Have you sent your donation ?

A Message from the Editor

RADIO SETS FOR THE R.A.F.

The object of this Fund is to provide portable radio sets for the isolated units of the R.A.F., who are in urgent need of this means of keeping in touch with current events and hearing the programmes of the B.B.C. These units, which include the Observer Corps and outlying detachments of all kinds, are on watch unceasingly, day and night, for enemy activities. The conditions in which they work cut them off almost entirely from any form of amusement, and their off-duty hours are apt to become very monotonous. For these units a radio set will come as the most welcome of all gifts.

The Fund is in direct association with the R.A.F. Comforts Committee, and all money received will be forwarded to this Committee *without any deduction whatever for working expenses.* The Committee will buy suitable radio sets, and distribute them where they are most needed.

I appeal to every one of you to look on this Fund as your own special way of making things more cheerful for the men of the R.A.F. Tell your parents, uncles and all other relations about the Fund, and gather in their subscriptions.

Readers, this is our very own Fund. Help me to make it a resounding success!

THE EDITOR.

A second cheque, for £25, has been sent to the R.A.F. Comforts Committee. This brings the total amount already sent to the Committee to £75.

SECOND LIST OF DONATIONS

	£	s.	d.
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	£77	15	0

All envelopes containing contributions should be addressed as follows: The Editor, R.A.F. Fund, "Meccano Magazine," Binns Road, Liverpool 13.



SHARP

"Putting a pin on teacher's chair is an old joke," said Mr. Thrasher, the schoolmaster.

"Yes, sir," chuckled Alfie; "but it hasn't lost its point yet."

* * * *

"Have you tried gargling with salt water?" said Jones to his sailor friend.

"Why, man!" replied the sailor, "I was one and a half hours in the sea last week after being torpedoed!"

* * * *

Lecturer, in village hall: "Now you all know what a molecule is—"

Chairman, interrupting: "Most of us do. But perhaps you'd explain for the benefit of those who have never been up in one."

* * * *

Doctor: "Have you any scars?"

Surprised Patient: "Sorry! I've only cigarettes."

* * * *

Manager: "We have to work to very fine limits in our workshops. Have you had any experience?"

Applicant: "Yes, sir. For years I used to cut the ham for restaurant sandwiches."

* * * *

"How did you learn to use both hands equally well, Pat?"

"Shure now and me faether, he always said to me: 'Pat, learn to cut your finger-nails with yure left hand, fer some day ye might be afther losing yer right hand.' "

* * * *

The absent-minded professor was busy in his study. "Have you seen this?" said his wife, entering. "There's a report in the paper of your death."

"Is that so," returned the professor without looking up. "We must remember to send a wreath."

* * * *

Customer (having a rough shave): "I say, barber, have you another razor?"

Barber: "Yes, why?"

Customer: "I want to defend myself."

* * * *

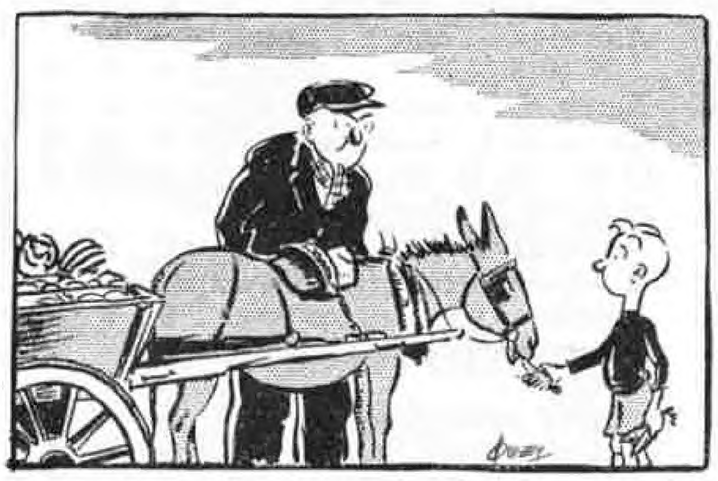
A very thin full-back was annoyed by the attentions of a small dog during a "rugger" match.

At last, when play had moved to the other end the back shouted to the spectators: "Whoever owns this dog might call him off."

Voice responded: "Come here, Spot. Them ain't bones, boy—them's legs."

* * * *

CHARITY



"You're a good little chap being so kind to dumb animals. Who gave you the carrots?"

"I took 'em from the back of your cart."

* * * *

"What do the three balls in front of a pawnshop mean?"

"Two to one you don't get it back."

* * * *

Tramp: "Spare a copper sir? I'm an old soldier."

Retired Colonel (trying to catch him out): "What regiment?"

Tramp: "As I was going to say, sir, I'm an old soldier who is suffering from loss of memory."

OUTSIZE IN FEET

A business man was discussing his son and heir, whom he had recently taken into partnership:

"Well, yes, he's shaping pretty well, but he has a long way to go yet before he'll have a head big enough to fill my shoes."

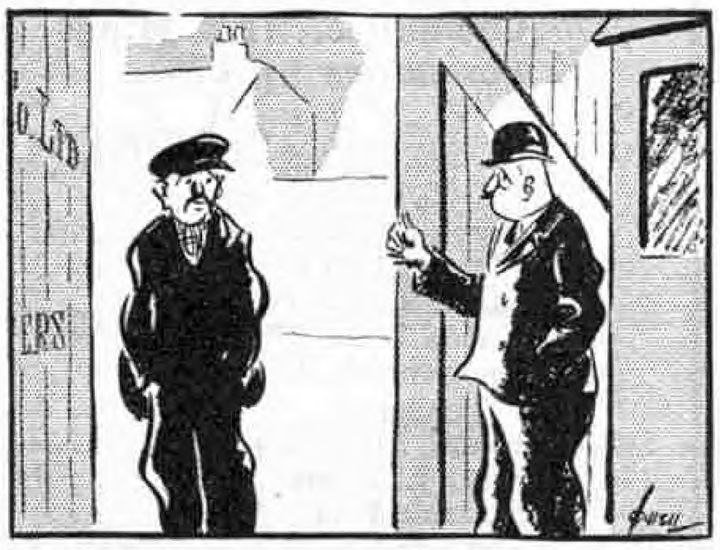
* * * *

The young Militiaman had been pulled up by the Major for passing with a cigarette in his mouth and not saluting."

"Sorry, Sir," he said, "but the Sergt. Major told me that I was never to salute with a cigarette in my mouth!"

* * * *

THE PESSIMIST



"Hi, do you know buzzer's gone?"

"I'm not surprised. They'd take anything round here."

* * * *

Teacher (to class): "Now, children, I want you all to draw a ring."

All the children did so except Tommy, who drew a square.

Teacher: "Tommy, I told you to draw a ring, and you have drawn a square. Why?"

Tommy: "Well, mine's a boxing ring."

* * * *

Candidate: "How did you like my speech on the agricultural problem?"

Farmer: "It wasn't bad, but a day's rain would do a heap more good."

* * * *

The producer of a local dramatic society was giving some final instructions before the curtain went up on the first night of the show.

"Now don't forget," he told the heroine, "when the villain enters you have to call out loudly 'Oh! oh! oh! please save me'!"

But the heroine was a telephone girl, and she brought down the house when she cried, "Oh, double oh, please save me!"

* * * *

Willie: "Dad, which is the longest river in the world?"

Father: "I don't know, my boy."

Willie: "You don't know. And to think that at school to-morrow I may be punished for your ignorance!"

* * * *

Mr. McTavish: "Are those your new boots ye're wearing, Jamie?"

Jamie: "Aye, faither."

Mr. McTavish: "Well, tak' longer strides, then!"

* * * *

Mother (after relating pathetic story): "Now, Reggie, wouldn't you like to give your bunny to that poor little boy who hasn't any father?"

Reggie (clutching rabbit): "Couldn't we just give father instead?"

* * * *

THIS MONTH'S HOWLER

Catarrh is a musical instrument, especially in Spain.

OBVIOUS

One day, two natives were watching a leopard chasing their friend.

First Native: "Can you spot the winner?"

Second Native: "The winner is already spotted."

* * * *

Teacher: "Can you tell me what causes trees to become petrified?"

Bright Student: "The wind makes them rock."

* * * *

The storm was raging and the ship was obviously in peril when the old lady reached the beach.

"Can't somebody do something?" she exclaimed.

"It's all right," remarked a bystander; "they've sent 'em a line to come ashore."

"Gracious me!" exclaimed the lady. "Were they waiting for a formal invitation?"

* * * *

A local inhabitant was accosted by a stranger in the street.

"Which is the quickest way to the station?" he asked.

"Run," was the reply.

* * * *

An American visitor was standing on the platform of a station when the "*Flying Scotsman*" rushed through. "Do you call that an express?" he asked a porter who was standing near by. "Bless your life, no!" exclaimed the porter, "that's Bill doin' a bit of shunting; he'll be back in a minute."

* * * *

Tommy: "Funny names your towns have—Bac St. Maur, Gringons-sur-Saone, Baulleul."

Poilu: "You live in London?"

Tommy: "Yes, but I spend part of my time at Stow-in-the-Wold, and visit relations at Biggleswade and Leighton Buzzard."

* * * *

Jim: "Can anything be made longer by cutting the ends?"

Tom: "Of course not!"

Jim: "Then how about a ditch?"

* * * *

In the train from Southampton to London a man was speaking to an American girl who was paying her first visit to this country.

"I think your English countryside is lovely" she said, "but your cattle seem much smaller than ours."

The man replied: "That is to make milking easier—to have them nearer the ground."

"Say," said the girl earnestly, "aren't you Britishers tricky."

* * * *

HER MISTAKE



"Excuse me, madam. Hold on to my strap."

"I have one, thank you."

"No, you haven't. That's my ear!"

* * * *

"Isn't it wonderful, Professor? It takes the light of the stars millions and millions of years to reach us, and yet there they are—punctual every night."

* * * *

Visitor (in newspaper office): "What do you use that blue pencil for?"

Sub-Editor: "Well, to make a long story short, it's to—er—make a long story short."

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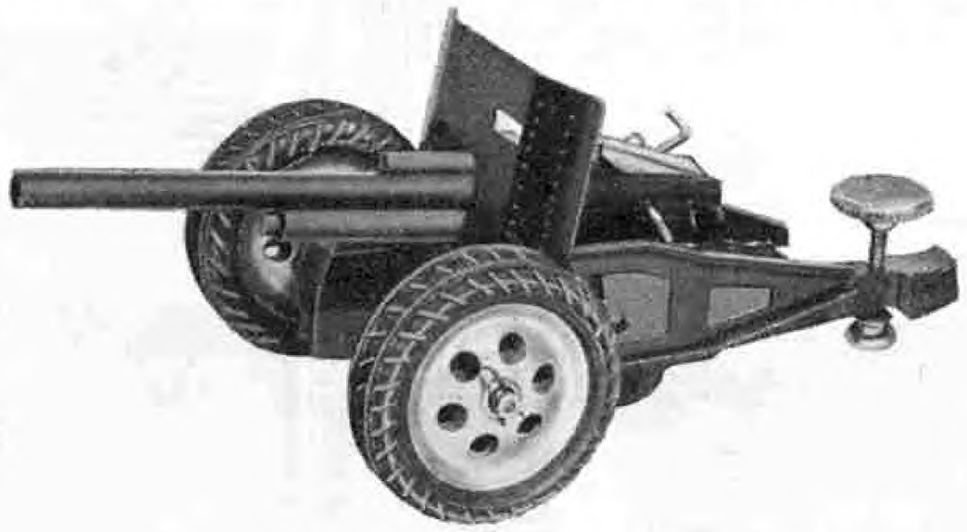


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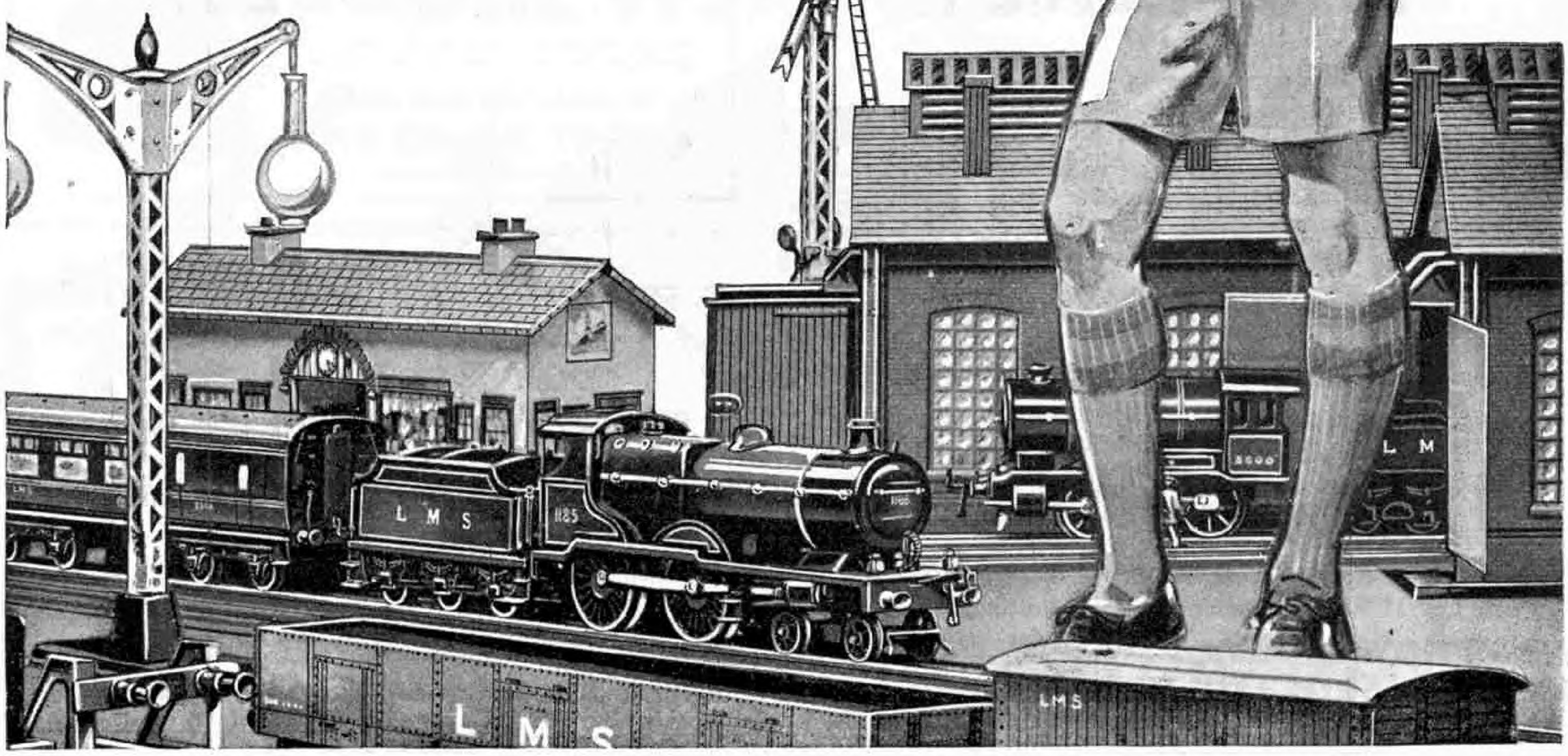
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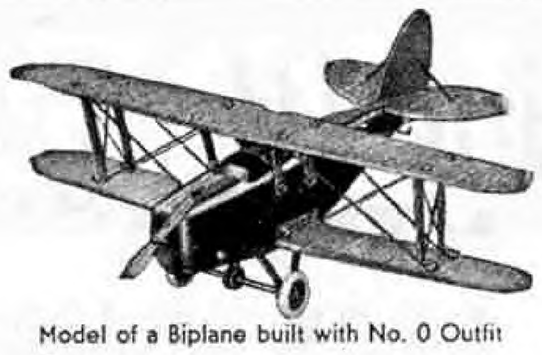
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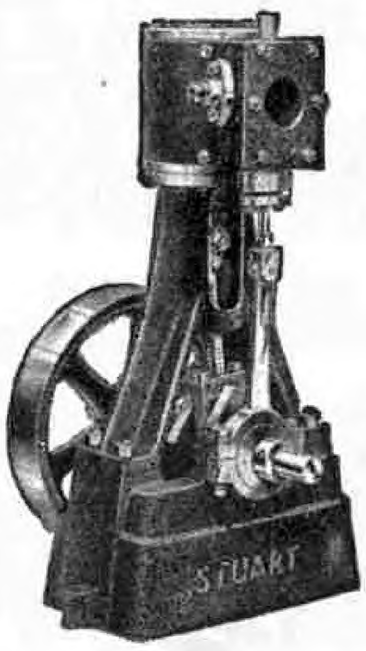
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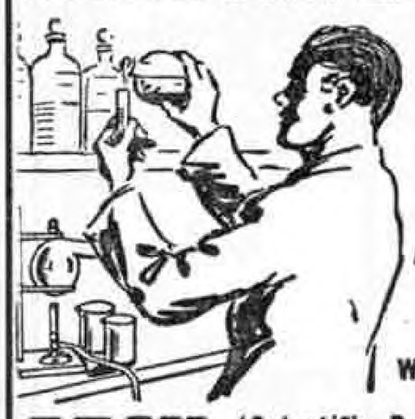
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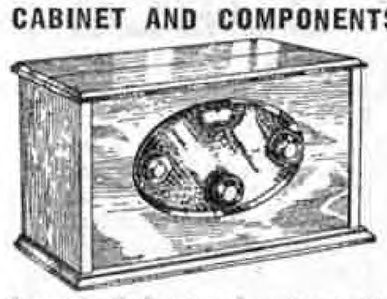
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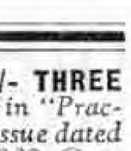
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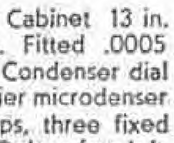


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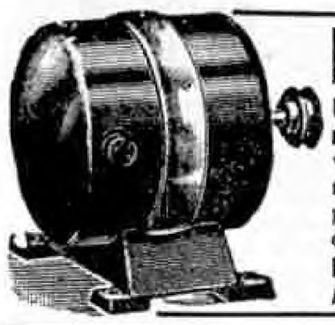
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Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

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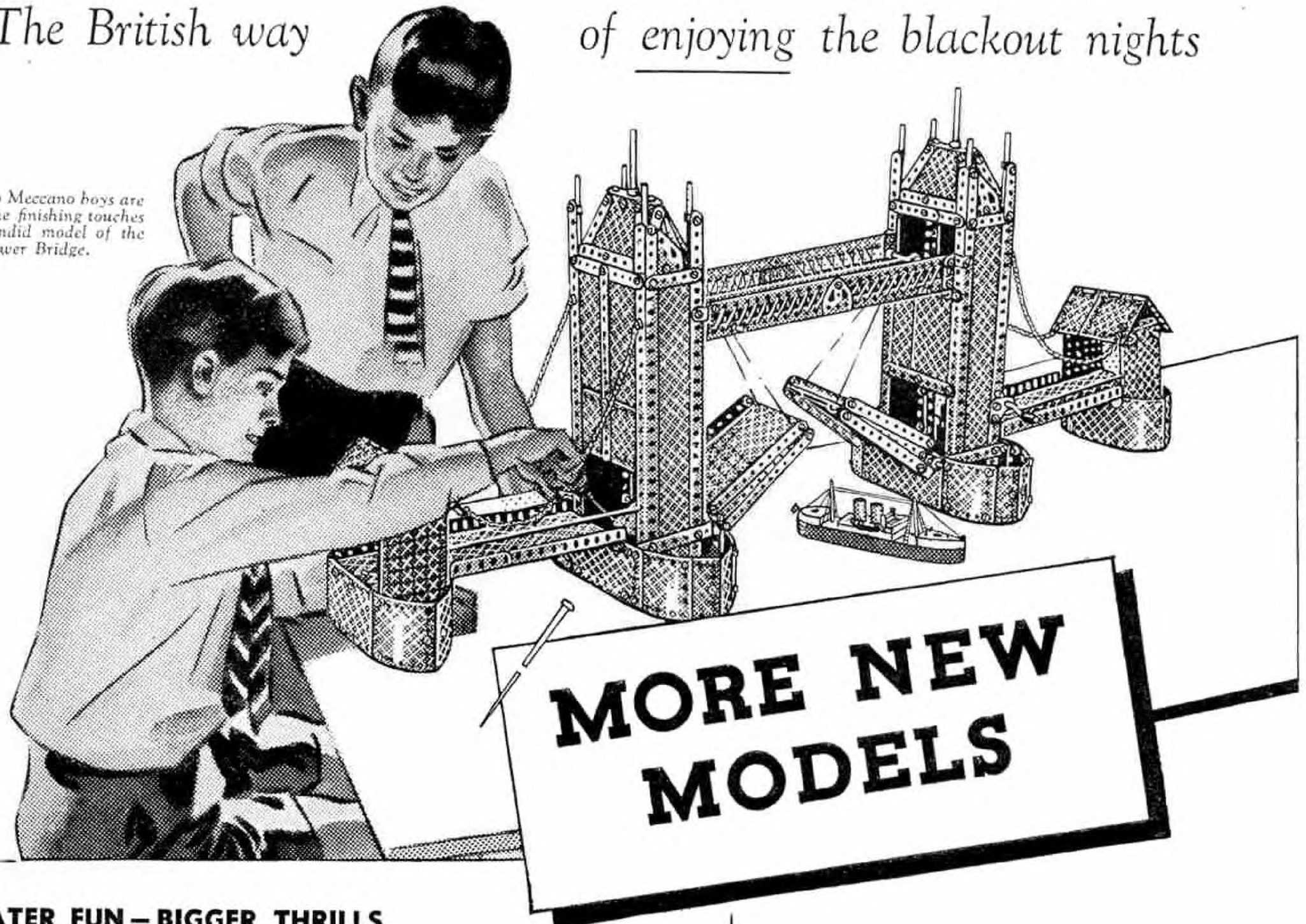
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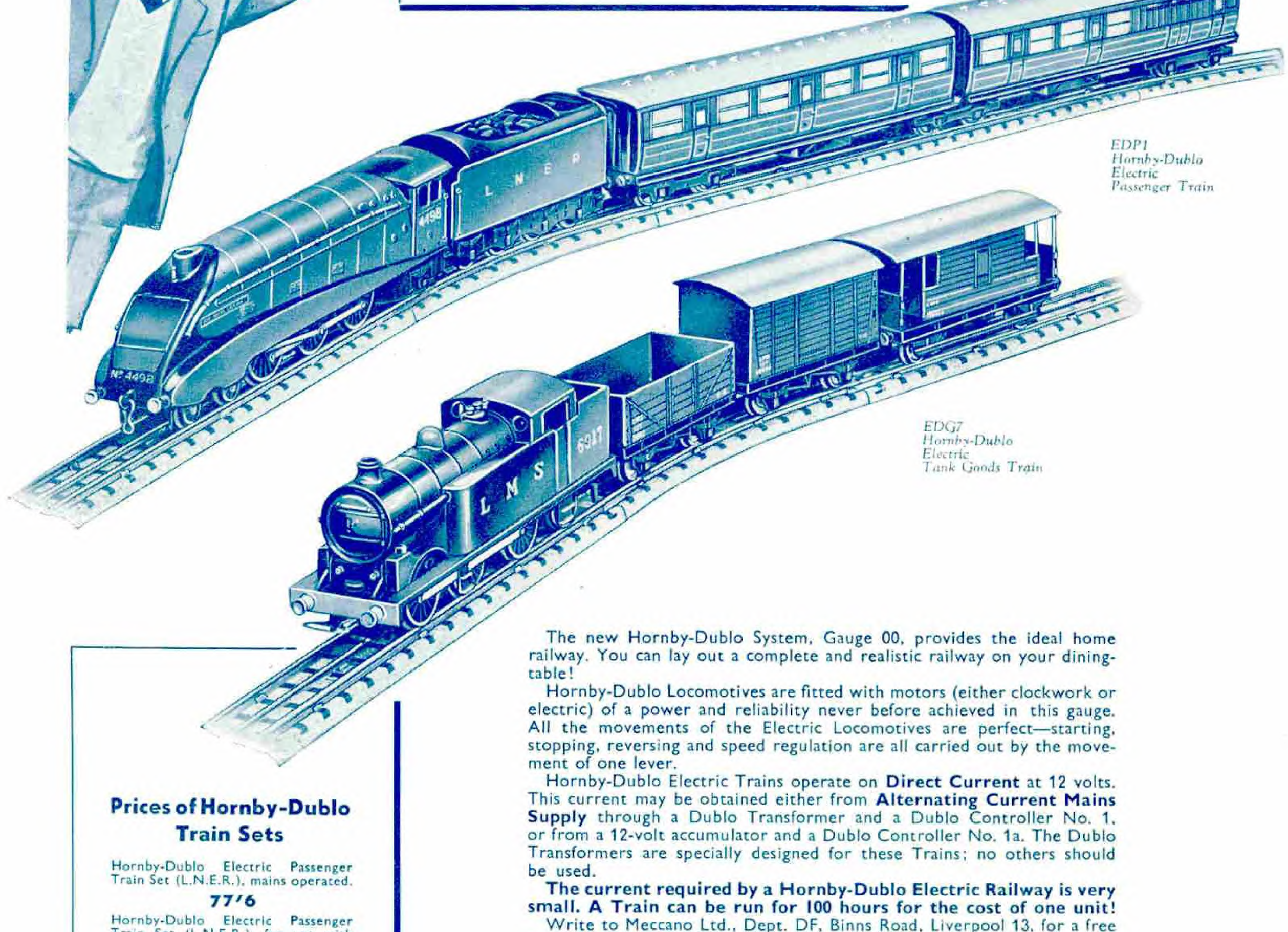
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